NEW ZEALAND GEOGRAPHER

.4 No. 1
RIL, 1948

N.Z. GEOGRAPHICAL SOCIETY (INC.)

THE NEW ZEALAND GEOGRAPHER

Volume IV, Number 1, April 1948

Contributors to this issue—

Mr. L. K. Munro, ll.m., is editor of the *New Zealand Herald* and amongst the best informed commentators on world affairs in the Dominion. Mr. Munro contributed 'The Canberra Pact and the Political Geography of the Pacific' to the first issue of the *New Zealand Geographer.*

Mr. J. W. Fox, b.a., is Lecturer in Geography at Auckland University College and Assistant to the Editor of the Society's journal.

Professor R. G. Bowman, ph.d., is a senior teacher in the Department of Geography at Iowa State University, Iowa City, Iowa. He spent 1940 in New Zealand as Assistant Lecturer at Canterbury University College. Military service with the United States Forces subsequently took him to Australia, New Guinea and many parts of the Pacific.

Sir Albert Ellis, c.m.g., is New Zealand Government Representative on the British Phosphate Commission. He has written a number of books describing some of his lifelong experiences in the Pacific.

Mr. John Pascoe is one of the Dominion's best known photographers and mountaineers. He is now working with the War Histories Branch of the New Zealand Department of Internal Affairs. His 'Canterbury High Country: The Sheep and Sheepmen of the Mountains' contributed materially to the success of the initial issue of this journal.

Dr. I. D. Blair, m.agr.sc., ph.d., is Lecturer in Microbiology at Canterbury Agricultural College, and was formerly on the staff of the New Zealand Department of Agriculture, as Assistant Supervisor of the Services Vegetable Production scheme.

Reviews and other contributions to this issue are by—

Mr. W. T. G. Airey, Senior Lecturer in History, Auckland University College.

Professor J. A. Bartrum, Department of Geology, Auckland University College.

Professor C. A. Cotton, Department of Geology, Victoria University College.

Professor G. Jobberns, Department of Geography, Canterbury University College.

Professor G. H. Lawton, University of Washington, Seattle, U.S.A.

Mr. L. P. Lee, Computer, Head Office, New Zealand Department of Lands and Survey.

Mr. R. G. Lister, Lecturer in Geography, Auckland University College.

Mr. L. W. McCaskill, Lecturer in Rural Education at Canterbury Agricultural College, Lincoln.

Professor W. P. Morrell, Department of History, University of Otago.

Mr. K. Sinclair, Lecturer in History, Auckland University College.
and Editorial.

THE NEW ZEALAND GEOGRAPHER

CONTENTS OF VOLUME IV, NUMBER 1, APRIL, 1948

PAGE

Geography and New Zealand's External Relations . *By L. K. Munro* 1

New Zealand and the Pacific: Some Strategic Implications *By James W. Fox* 15

Land Settlement in New Guinea . . . . *By Robert G. Bowman* 29

New Zealand Farms and the 'Phosphate Islands' . . *By Sir Albert Ellis* 55

Services Vegetable Production: Market Gardening in Wartime *By Ian Blair* 69

Photogeography: A Pictorial Survey of New Zealand . . *By John Pascoe* 78

New Zealand Geographical Society: Branch Affairs 88

Geographic Notebook 90

In Our Contemporaries 96

Reviews 105

The Society is not responsible for the opinions or statements of writers in this Journal.

Published half-yearly at the press of

WHITCOMBE AND TOMBS LTD., CHRISTCHURCH, NEW ZEALAND

by the New Zealand Geographical Society (Incorporated)

EDITORIAL OFFICE: Auckland University College, Auckland, New Zealand

MEMBERSHIP OF THE SOCIETY is to be obtained through the constituent Branches: Annual dues *fifteen shillings*. (Members are entitled to receive one copy of all the Society's publications.)

SUBSCRIPTIONS TO THE JOURNAL are accepted from libraries and other organisations in New Zealand at the annual rate of *ten shillings*, and from both libraries and individuals overseas at the rate of *ten shillings* in the currency of the country to which the journal is to be addressed. (*Three dollars* in the United States and Canada.)

GEOGRAPHIC NOTEBOOK

PAGE
Electric Power Supplies 90
Social Studies Through Geography 92
Coal Production and Supply 93
The Society's Library 93
Agricultural Statistics 94
New Zealand Time 104

IN OUR CONTEMPORARIES

1. *In New Zealand Journals . . .*

International Responsibilities in the Pacific . . . *By Willis Airey* 96
Technology and New Zealand Agriculture . . . 97
Canterbury Farming 99
Studies in Farm Management . . . . . . *By L. W. McCaskill* 100
Geomorphology for Motorists . . . . *By C. A. Cotton* 100

2. *In Overseas Journals . . .*

Where Angels Fear to Tread . . . . . *By C. A. Cotton* 100
Problems of Urban and Rural Planning in Great Britain *By Graham H. Lawton* 101

REVIEWS

G. L. Wood. Australia: Its Resources and Development
Horace Belshaw. New Zealand . . . . *By G. Jobberns* 105
C. B. Brereton. No Roll of Drums.
H. D. B. Dansey. How the Maoris Came to Aotearoa . *By J. C. Reid* 106
A. J. Harrop. New Zealand After Five Wars . . *By Keith Sinclair* 107
The Mapping of Otago . . . . *By L. P. Lee* 108
English County: A Planning Survey of Herefordshire
Devon and Cornwall: A Preliminary Survey . . . *By R. G. Lister* 109
Ed. E. Lynam. Richard Hakluyt and his Successors . *By W. P. Morrell* 111
Wellman Chamberlin. The Round Earth on Flat Paper . *By L. P. Lee* 112
R. F. Flint. Glacial Geology and the Pleistocene Epoch *By J. A. Bartrum* 113

New Zealand Geographer

VOLUME IV April, 1948 NUMBER 1

GEOGRAPHY AND NEW ZEALAND'S EXTERNAL RELATIONS

L. K. MUNRO

THE PROBLEMS of New Zealand's foreign policy flow from the position of the dominion as a small and remote power in the South Pacific. Her population is something under 1,800,000 and shows no signs of rapid growth, either by natural increase or by immigration. The dominion has no heavy industries for the manufacture of major armaments. It is separated by great distances from Britain and the United States. Australia, New Zealand's closest neighbour, although capable of manufacturing armaments in considerable quantities, is incapable of defending herself alone against a major power and could not, if attacked by such a power, lend any worthwhile assistance to New Zealand.

These are geographic facts which no eloquent declarations on international policy by some New Zealand or Australian politicians can or should obscure. Such facts obviously give New Zealand a vital interest in the strength and unity of the British Commonwealth of Nations. They also give the dominion a vital interest in the peace and prosperity of the Pacific. In particular New Zealand has certain responsibilities in the South Pacific. Such are the considerations which must guide whatever government holds office in the dominion in the foreseeable future.

New Zealanders are conscious of the geographic significance of their territory. The territorial integrity of both Australia and New Zealand must always be of great importance to any power resisting aggression in the Pacific. When the Japanese reached New Guinea, the United States forthwith despatched forces to Australia and New Zealand. This action by the Americans was of course not inspired solely by a desire to save the Pacific dominions from the horrors of Japanese occupation. Its dominating purpose was to establish an important jumping off place for the thrusting back to their homeland of the Japanese armies.

Nor must it be forgotten that in Sydney and Auckland the dominions have two important naval bases. The first can repair battleships and the second cruisers. Both Australia and New Zealand are white men's countries in which white troops can recuperate. It is therefore true that while New Zealand is a small and a weak power, the integrity of her territory must generally be a matter of importance to the United States and Great Britain. In fact, as it has been a cardinal point of British foreign policy to maintain against any aggressor the independence of all small nations along the far flung line of British communications, Great Britain will always have an important interest in the preservation of New Zealand.

Those responsible for the foreign policy of New Zealand have to consider the likelihood of the rise of another aggressive power in the Pacific and indeed of the resurgence of Japan. Even though New Zealand's burdens are considerable she sent a Brigade Group and an Air Force Component to the British Commonwealth Occupation Force in Japan. She has a vital interest in the economic policy to be laid down for the future of Japan. But that is to state the matter too narrowly; the economic prosperity of China, Siam, Malaya, Indo-China and Indonesia is wrapped up with the progress and stability of the Pacific. Peace is indivisible from economic prosperity.

New Zealand is aware that Russia is a Pacific power and is anxious to know the precise objectives of the Soviet Union in this great ocean. New Zealand, as a power of the South Pacific, with a considerable native population in the dominion itself, and responsible in addition for the government of native peoples in Western Samoa and other islands such as the Cook group, is convinced of the necessity of ensuring the health and promoting the political responsibility of all the original inhabitants of Polynesia and Melanesia.

Such is a brief formulation of the leading factors—many of them simple geographic factors—that influence and limit New Zealand's foreign policy. The more important of them must now be considered in greater detail.

Cornerstones of Foreign Policy

New Zealand's devotion to the objectives of the United Nations needs no emphasis. Indeed the Prime Minister of New Zealand, Mr. P. Fraser, stated at San Francisco that the Charter represented the last hope of mankind, although some in New Zealand may be inclined to accept the observation of M. Bidault that the resources of Providence are perhaps inexhaustible. Mr. Fraser took a prominent and useful part in the deliberations at San Francisco and more recently in the discussions of the General Assembly in London. At San Francisco he was a strenuous opponent of the power of veto, the use of which he regarded, perhaps only too truly, as such a shock to the nations as to endanger the whole structure of the United Nations. Nothing that has occurred since 1945 has proved Mr. Fraser wrong.

New Zealand, under Mr. Fraser's government, has been a champion of the rights of small powers. Mr. Fraser has shown himself quite unwilling to concede to the three great powers the sole right to settle the frontiers of the new Europe. Our men fought and died from El Alamein to Trieste to exterminate Nazism and although ours was a small force we have it on high authority that it played some part in final victory. As New Zealand's Prime Minister said on September 7, 1945: 'New Zealand in our view is entitled to a voice in the conduct of international relations. We have paid a heavy price for such a voice, and if anything goes wrong we shall have to pay a still heavier price in the future.'

New Zealand is particularly interested in the question of trusteeship. But while the government is wholehearted in its support of the United Nations the conception arouses no great enthusiasm among the people. The average New Zealander has lost his early belief, never very profound, in the high motives of Russia. He strongly suspects that country, under Stalin's domination, of pursuing a policy and a method little different from those of Hitler. He is therefore convinced of the necessity for strengthening our bonds with Great Britain and the sister dominions, as the only assurance of his security, unless the United States can also be secured as a firm ally. He is certainly concerned in the working out of a defence scheme with Australia.

A Common Empire Policy ?

It has been fashionable in certain circles to decry the so-called traditional New Zealand attitude of accepting unquestioningly the foreign policy of Great Britain. This view does not take sufficiently into account the difficulty under which every dominion laboured more or less of being forced to accept decisions which the Government of the United Kingdom had to make quickly or which had become inevitable because of earlier negotiations in which the dominions took no part. Moreover, at any rate until 1935, the cabinets of New Zealand had little to say in foreign affairs and their reticence was often mistakenly interpreted as evidence of lack of interest, supine compliance, or both.

Since the advent of the Labour Government in 1935 there has been much more ministerial comment on foreign policy. On occasion the government has taken publicly an independent line as it did in 1936 over the Abyssinian question. But on most questions it has followed the lead of the British Government. Thus, in spite of its distaste for the dictators, there is no evidence that it dissented in a less degree from the Munich settlement. When war broke out in 1939 Mr. M. J. Savage, the Prime Minister, declared in eloquent if simple words 'Where Britain goes, we go; where she stands, we stand.' Our declaration of war was simultaneous with that of Britain.

On the other hand, Mr. Fraser on one notable matter dissented vigorously from Great Britain. At the San Francisco conference he opposed, actively but of course unsuccessfully, the introduction of the veto into the Charter, although all three great powers, including Britain, supported it. But, with this exception, it does not seem that the present government is inclined to depart from the attitude of its predecessors and strike an independent line in foreign policy. Mr. Fraser is proud of Mr Churchill's statement that New Zealand never put a foot wrong during the war.

The question then arises whether New Zealand approves Lord Halifax's proposals in 1944 calling for a common empire foreign policy and for a reintegration of the empire faced with the enormous power of the United States and Russia. Mr. Curtin had, in the election campaign of 1943, and later at the meeting of prime ministers in 1944, raised the question of new machinery for closer relations between the members of the commonwealth and in particular of an imperial secretariat and of a more efficient standing consultative body.

A great many in New Zealand, particularly those conservatives who were becoming rather impressed by Mr. Fraser's attitude on foreign policy, expected him to support the proposals of Lord Halifax and Mr. Curtin. There was therefore some surprise when in May 1944 he stressed that the British Commonwealth cannot speak with a single voice for 'we all have different problems and I will not presume or dare to speak on questions affecting the internal policy of other dominions.'

While he was in Canada in July 1944 Mr. Fraser said at a press conference; 'It is no good at all for the British Commonwealth of Nations to enter international organisations en bloc.' In thus wholeheartedly supporting Mr. Mackenzie King's opposition to Lord Halifax's proposals, Mr. Fraser made it clear that each dominion should speak for itself in foreign policy.

After the San Francisco conference Mr. Fraser declared that there was no attempt to form a British Dominions bloc or to 'gang up' against the other nations. In April 1946 Mr. Walter Nash, the Minister of Finance, threw cold water on reports by London newspapers of an empire supercabinet to plan for all empire countries on subjects of general concern. The minister stated his definite opposition to any idea of a supercabinet. Presumably he would oppose Lord Bruce's recent proposals for a Council of British Nations.

Reasons For and Against

The opposition in New Zealand to a common empire foreign policy is variously put. For one thing it is said that the perfect system of intercommonwealth consultation has yet to be created. It is true in recent years that every dominion cabinet is given from London almost continuously very full information on all matters of commonwealth concern. Thus the dominions should know in time to express their approval or disapproval of steps contemplated by the Government of the United Kingdom. But apart from the making of decisions in very urgent matters without dominion consent, there is, as already mentioned, action on preliminary and seemingly unimportant points which in the long run make a certain decision inevitable. It is here the dominions, while finally consulted, have virtually no choice but to accept a decision or in serious cases openly to dissent from United Kingdom policy.

In view of the anxious desire of the New Zealand Government to work in the closest unity with Great Britain it is to be hoped that some method can be devised to meet the difficulty. Despite Mr. Fraser's support of Mr. Mackenzie King's opposition to Lord Halifax's proposals, New Zealand is much less likely to take an independent move than Canada. The reasons are set forth at the commencement of this article. New Zealand has compelling reasons for the fashioning of a common empire foreign policy. And indeed, if Russia continues her present expansionist policy, Canada may soon find that her desire to balance herself between Russia and the United States is impossible.

The United States must for her own preservation eventually intervene in any struggle involving the independence of Great Britain. That intervention has in the past been unfortunately tardy. Canada has, therefore, a vital interest in working for a British foreign policy which will not put too great a strain on American support. Nor can Canada be blind to certain American interests which are by no means sympathetic towards the British Commonwealth. If the continuance of the commonwealth is desirable in the interests of the world, that objective will not be achieved if its members follow divergent foreign policies, thus playing into the hands of its enemies, or of those who are not its friends.

Consultative Machinery

It is easy enough to say it is better to seek agreement within the commonwealth rather than try to legislate it into being. But it does not appear that Lord Halifax was proposing the creation of a common foreign policy by means of legislation. What he probably had in mind was certainly no reduction of autonomy of the dominions. But if the present consultative machinery can be improved then there seems no reason why the members of the commonwealth should not seek a common foreign policy where divergence in so vital a matter has previously encouraged our enemies.

One valuable suggestion has been made by Professor Julius Stone of the University of Sydney. It is that 'before issues are actually formulated by governmental action, that is, during the prolonged period of expert and administrative inquiry and interchange, dominion viewpoints could more easily receive their due weight and influence both on what issues emerge as important and on each member's attitude towards them. Only if dominion personnel were adequate in number and consequently able to specialise to a degree, could effective dominion participation take place in these preparatory stages.' In short, if New Zealand's representation in, for example, the Foreign Office were substantially increased, something would be done on the lines suggested by Professor Stone. At present the dominion has a liaison officer with the Foreign Office, Sir Cecil Day. The fuller the consultation the less the need for any supercabinet of which Mr. Nash has expressed disapproval.

Mr. Fraser has not publicly expressed his view of Mr. Curtin's proposal for an empire secretariat. However, it is significant that the

Australian-New Zealand Agreement of January, 1944, generally known as the Canberra Pact, provides for a permanent secretariat for continuous consultation between the Australian and New Zealand Governments, which agree to consult and collaborate in all matters affecting the peace, welfare and good government of the Pacific and all defence matters of mutual interest. The secretariat is apparently not a joint one, but exists separately in each dominion.

Australian-New Zealand Relations

We now come to a consideration of the extent to which Australia and New Zealand have agreed on a joint foreign policy, as a result of the provisions of the Australian-New Zealand Agreement. Speaking on 10 February 1944, Dr. Evatt claimed that 'the strengthening of two members of the commonwealth by their agreement to act together in their external relations should be a valuable contribution to the strength of the commonwealth as a whole.' In fact there have been numerous consultations since the agreement and pursuant to it. Before a recent visit of Mr. Nash to England, he accompanied Mr. Fraser to Canberra to discuss with the Australian cabinet, matters of common concern to both countries to be discussed at the conference of dominion representatives in London. It would be a mistake, however, to assume that the effect of the agreement is that in the Pacific the two dominions will always pursue a joint policy or that their policy is likely to diverge from that of the United Kingdom. They all certainly take a strong stand in matters affecting the Pacific and Australia will probably endeavour to take the lead. An example is the appointment of an Australian officer to command the British Commonwealth Occupation Force in Japan.

But the agreement in the Canberra Pact is regarded more particularly as an agreement to consult. It is certainly not regarded in New Zealand as an attempt to take over the interests of the United Kingdom in the Pacific. The anxious desire of this dominion is to keep Great Britain in the Pacific where her interests are great and important for the prosperity and security of New Zealand. Nor does the agreement imply that New Zealand has the remotest intention of surrendering leadership in foreign policy to Australia.

Equally it would be a great mistake to construe the agreement as in any way unfriendly to the United States. Our indebtedness to that country for its efforts on our behalf in the recent war in the Pacific is great and well known. Only less fundamental than close unity with the United Kingdom must be a close understanding between New Zealand and the United States. Each country now has a minister accredited to the other. It is true that the demand for certain bases by some American interests has occasioned some concern in New Zealand. But in a press interview in April 1945 Mr. Fraser stated: 'Future peace and security in the Pacific will be made more certain with the United States in control of strategic islands, including those formerly held by Japan.' On 11 April 1947 Mr. Fraser said that it was essential for the future welfare and security of Australia and New Zealand that the United States should be allowed to establish bases in the Pacific.

There then arises the question of American bases on British territory. The New Zealand view, both governmental and privately expressed, is that while the dominion would welcome the construction of American bases in British territory in the Pacific, the commonwealth countries should share with the United States the right to use such bases. The Canberra agreement of January 21, 1944 declares (Clause 16) that the construction and use of bases for war purposes should not carry with it any claim to sovereignty, and it asserts (Clause 26) that the disposal of enemy territories in the Pacific should require the agreement of the two dominions. The disapproval of these provisions in some of the editorial columns of American newspapers has been noted in New Zealand. There is a section of dominion opinion, strongly opposed to the government, which regards the Canberra Pact as presumptuous and a silly warning to a powerful nation. But in so far as there is an informed public opinion on the agreement a widely held view is that Australia and New Zealand, small as they are, contributed not unimportantly to the defeat of Japan and as a result, because of their geographical position are entitled and indeed bound to put on record their views as to the future of the Pacific and the bases to be established in that ocean.

Professor P. E. Carbett, Professor of Government in the University of Yale, has put the matter well from the standpoint of Australia and New Zealand when he writes that 'it would have been shortsighted to encourage by their silence any idea that they would be passive spectators in the eventual Pacific settlement.'

New Zealand's Pacific Relations

Events in 1946 and 1947 showed New Zealand taking a prominent part in the development of the South Pacific. The dominion submitted a draft trusteeship agreement for Western Samoa to the United Nations in November 1946. It stood firm against Russia in her claim to defend the territory and make effective provisions for that defence free from the jurisdiction of the Security Council. Eventually the Assembly gave its approval to the draft.

In July 1947 a mission from the Trusteeship Council arrived in Western Samoa to consider, at the invitation of the New Zealand Government, the Samoan petition for selfgovernment. While this mission was conducting its investigations, the New Zealand Government announced certain provisions for giving the Samoans a greater voice in their own affairs. The mission's subsequent report did not greatly differ from New Zealand's proposals. The report can be briefly summarised thus: while the Samoan members of a proposed council of state should have the right to initiate legislation, New Zealand's representative, who would preside over the government of Samoa, should have the exclusive right to initiate money bills, as well as the right to disallow measures passed by the local legislature. The report of the mission praised New Zealand for doing much for Samoa, in spite of the fact that there have been only ten years where fruitful activity was possible.

In December 1947 the Trusteeship Council 'noted with satisfaction' the steps to be taken by the New Zealand Government in Western Samoa: the establishment of a council of state, comprising the administrator and the three *Fautua*, or leading chiefs: the replacement of the present legislative council by a legislature in which Samoan members will have an absolute majority and which will have full powers in all matters affecting the territory, with certain stated exceptions; the *Fono of Faipule*, or Samoan advisory council, to remain as at present; and the Samoan public service to be subject to an independent authority in Samoa. But the New Zealand Government will have the final voice in all matters affecting defence, external affairs, control of the public service, the imposition of discriminatory customs duties, currency and banking, immigration and any matters affecting the prerogative of the Crown or the title to Crown lands.

South Pacific Commission

Apart from its special interest in Western Samoa, the Government of the Dominion of New Zealand is taking a leading part in the postwar settlement of the South Pacific. The establishment of a regional advisory commission for this area will be the outcome of the Canberra Pact. In November 1944 the Australian and New Zealand Governments reached agreement as to the general structure of the commission whose territorial scope will comprise 'all those non-selfgoverning territories in the Pacific Ocean which are administered by the participating governments and which lie wholly or in part south of the equator and east from and including Netherlands New Guinea.' But in spite of the progress made since that time, notably at the conference held at Canberra from 28 January to 6 February 1947, the commission is not yet a reality. The history of the matter is of some interest and importance.

The governments of the two dominions have been impressed by the precedent of the Anglo-American Caribbean Commission established in 1942, and with which France and the Netherlands became associated in 1946. With this commission in mind the Australian and New Zealand Governments convened the South Seas Commission Conference at Canberra in January 1947 and jointly invited the governments of the United Kingdom, the United States, France and the Netherlands to take part. These invitations were duly accepted. The purpose of the conference was to discover means of establishing a regional advisory commission for the South Pacific. Agreement was reached by the parties but although accepted by the governments of the United Kingdom, Australia and New Zealand within a few months of its signature at Canberra, the agreement has not yet been ratified—'accepted' is the word used in the document itself—by the remaining governments.[1]

The parties to the agreement determined that the commission should be an advisory body 'which would act in a consultative capacity for the governments concerned in regard to the promotion of native welfare and the social and economic development of the inhabitants of the territories involved. Australia and New Zealand, as sponsoring powers, also made it clear that any consideration of political or security matters was excluded. The invitation proposed that the functions of the commission would be to advise member governments on such questions as co-operation in regard to health services and education, the maintenance and improvement of standards of native welfare, research in economic, social and anthropological fields, and in regard to material development, as, for example, expansion of production, communications and marketing.'

---

[1] Late in January 1948 it was announced in Washington that the agreement has been accepted by the United States.

The exclusion of political matters from the scope of the proposed commission was based 'not on the belief that they are of any less importance than the other aspects of advancement—they are, indeed, the primary aim of administration—but on the conviction that healthy political development is possible only as the inhabitants of the territories can be assisted to solve the problems which press most heavily and immediately upon them. The first necessity is to improve health, provide better educational facilities, improve living standards, and generally to provide a fuller enjoyment of life. These measures go hand in hand with a steady removal of the sense of isolation, which is, perhaps, the greatest bar to progress.'

Where political action has been found necessary in the South Pacific, as happened in 1946 in the case of Western Samoa, this has been taken by the government concerned, in this case, of course, the Government of New Zealand.

THE FUNCTIONS OF THE COMMISSION

Unlike the Caribbean Commission the South Pacific Commission, as it is compendiously called in the agreement, is not entirely advisory. By paragraph 7 of the agreement, 'the commission may discharge such other functions [in addition that is to its consultative and advisory functions] as may be agreed on by the participating governments.' The report of the committee of the conference on functions and powers says that, while no particular functions under paragraph 7 were discussed or agreed on at Canberra, it was contemplated that at some future time and with their prior agreement, governments may find the commission to be a convenient organ of collaboration between them in joint enterprises.

The consultative and advisory functions set forth in paragraph 6 of the agreement are worth quotation in full:

> (a) To study, formulate and recommend measures for the development of, and where necessary the coordination of services affecting, the economic and social rights and welfare of the inhabitants of the territories within the scope of the Commission, particularly in respect of agriculture (including animal husbandry), communications, ransport, fisheries, forestry, industry, labour, marketing, production, trade and finance, public works, education, health, housing, and social welfare;
>
> (b) To provide for and facilitate research in technical, scientific, economic, and social

fields in the territories within the scope of the Commission and to ensure the maximum cooperation and coordination of the activities of research bodies;

(c) To make recommendations for the coordination of local projects in any of the fields mentioned in the previous subparagraphs which have regional significance and for the provision of technological assistance from a wider field not otherwise available to a territorial administration;

(d) To provide technical assistance, advice, and information (including statistical and other material) for the participating governments;

(e) To promote cooperation with nonparticipating governments and with non-governmental organisations of a public or quasipublic character having common interests in the area, in matters within the competence of the Commission;

(f) To address inquiries to the participating governments on matters within its competence;

(g) To make recommendations with regard to the establishment and activities of auxiliary and subsidiary bodies.

There can be no question of the advisability and indeed the need for the establishment of the commission. Mr. Nash, the chairman of the New Zealand delegation at the conference, recognised in his report to his cabinet that the South Pacific territories do not form a compact and homogeneous region: 'The inhabitants in the Western Pacific territories are Melanesian in origin, while those in the Eastern Pacific are Polynesian. Between the two groups there are marked differences, both in fundamental characteristics and in the stage of development which they have reached. While the Australian and New Zealand Governments recognised that this division tends to increase the difficulty of regional cooperation, they were convinced not only that there are many problems susceptible of treatment on a regional basis, but also that the mere interchange of experience will be of great value. Additionally, the South Pacific Commission will establish research facilities which it would be beyond the capacity of certain of the individual territories to provide for themselves.'

Mr. Nash's observations gain cogency when it is remembered that there seems little coordination in primary production in island groups such as those of Samoa, Fiji, Tonga and the Cook Islands. There is an extraordinary diversity of jurisdiction. Samoa is administered by New Zealand as a trustee of the United Nations. The Fiji Islands are administered by the United Kingdom as a Crown colony. The Kingdom of Tonga possesses powers of selfgovernment but is not a sovereign state and enjoys the protection of the British Crown. The conference indeed recognised the anomalous position of Tonga and passed a resolution expressing the hope that the cooperation of this peaceful and prosperous island kingdom might be enlisted in appropriate activities of the commission.

Research and Development in the Pacific

There has, it is true, been considerable cooperation between the government of New Zealand and the administration of Fiji, notably in matters of defence, air communications, health and education. But such cooperation, not only with Fiji but with the other island groups, can be carried much further by the various Pacific governments. The conference, in matters of economics, enumerated the following projects as points for early consideration by the commission when it is finally set up:

(a) An economic survey to include native industries, native fisheries, native trading systems and native cooperative movements and organisations;

(b) A study of the mechanisation of production and of suitable schemes for the organisation of uniform grading, packing, pooling, and marketing of primary products such as copra;

(c) The development of schemes for the introduction to and distribution in the territories of potentially useful species, varieties, breeds, of strains of plants and animals;

(d) The taking of all possible steps, within the scope of the functions of the commission, to ensure adequate shipping services within the area.

As to (b) above it is noteworthy that the mission of the United Nations to Western Samoa recommended that, 'every effort should be made through research and development to extend the export products of the territory beyond their present limited range'. The research facilities of the South Pacific Commission will help.

No final agreement has been reached on the site of the headquarters of the commission. The New Zealand Government strongly favoured Suva, as being within the area to be covered by the commission. Island residents are critical people, and, if the commission is located among them, this criticism can be made to work for the good of the commission, since the pressure of public opinion will demand that the commission produce results and that those results be demonstrated in their practical application. Official and nonofficial residents alike will have greater reason to regard the commission as belonging to them and working for them, if it is located within the area, than if it is located at some distant point. Furthermore, it was observed that, in the case of the Caribbean Commission, the West Indian Conference of 1946 had reached the conclusion that, unless the secretariat were established in the area, much of the value of the commission's work would be lost.'

However the Australian delegation appears to have pressed for Sydney as the site for the headquarters. In the end it was agreed that temporary headquarters should be established in Sydney. The Governments of Australia and New Zealand have not delayed. In April 1947 they established an interim organisation of the commission in Sydney.

The preliminary work at Sydney of the representatives of the two governments has involved the assembly of the material for a small library and the collection of general data on questions that will have to be considered and examined when the commission itself is set up. In particular the interim organisation has devoted much attention to the structure and working of the Caribbean Commission.

A statement of the New Zealand Government on 20 November 1947, referred to a meeting of the representatives of all the signatory powers in Sydney. The object of this meeting convened by the Australian and New Zealand Governments, was the early establishment of the commission this year. It remains to be seen whether this object will be achieved.

NEW ZEALAND AND THE PACIFIC: SOME STRATEGIC IMPLICATIONS

JAMES W. FOX

NEW ZEALAND, as a part of the British Empire, is usually coloured red on a world map; and the map is drawn, more often than not, on the Mercator projection. Compared with the apparent and exaggerated vastness of Canada on this type of map, New Zealand is indeed a small country, the very insignificance of which is all the more pronounced because it is tucked away in the southeastern corner of the map. This representation is familiar to all Englishmen since a map of the British Empire is centred on the Greenwich Meridian, and consequently New Zealand is apt to be considered as some small, though not unimportant, territory on the other side of the world. But to New Zealanders also, this map is familiar, for most of the atlases used in the dominion are of British manufacture, although there are of course certain exceptions. New Zealanders, then, are conscious of the great distance between Wellington and London, for the British Isles lie halfway across the world via Suez or South Africa. The Panama route is sometimes forgotten, and the Cape Horn route always; for it is difficult to visualise routes which disappear over the eastern edge of the map, only to reappear on the western edge again.

New Zealanders have, therefore, tended to look westwards rather than eastwards, to Australia and beyond, so that the Suez and South African routes appear to have greater significance and appeal. With the advent of regular air transport the first links were again westwards and not towards the Pacific. The Pacific Ocean as an ocean, with bordering seas and lands, islands and peoples, did not feature in ordinary day-to-day conversation unless perhaps it was a farmer discussing the source of his fertiliser or a fruiterer explaining the absence of bananas. The people of New Zealand were content in their semi-isolation and looked towards Britain, not only as 'home', but as the mainstay of economic life and the bulwark of dominion defence.

War in 1939 and Japanese aggression produced a rapid reorientation of ideas. The Pacific assumed a strategic importance hitherto undreamed of, and remained in the forefront of events until the Japanese were finally rolled back and the first atom bombs were dropped on Hiroshima and Nagasaki. Almost three years have passed since then, and while the wreckage of war rusts and moulders on far atolls men have tried to forget, and to regain the old way of life. The Pacific is becoming merely an empty ocean again. Yet if Australia and New Zealand are to preserve their mode of life and standard of living, their place in the world and their national security and integrity, there must be aroused in their peoples a greater awareness of the implications of some of the strategic problems of the Pacific area.

The Magnitude of the Pacific

Of all the great expanses on the earth's surface the Pacific Ocean is by far the most difficult to comprehend, for it covers one third of that surface and, in the latitude of the equator, extends halfway round the world. The journey between Auckland and San Francisco, even by air, occupies almost two days of flying time. These great expanses and New Zealand's relationship to them are not emphasised by world maps on projections such as Mercator, Mollweide or Gall's Stereographic, or even by maps of the western or water hemispheres. To appreciate the real position of New Zealand in the world, and in the Pacific especially, recourse must be had to the Equidistant Azimuthal Projection centred on Wellington (*Fig.* 1).

In this map there is a great distortion of shape and size towards the margins, but its value lies in the fact that all distances and directions from Wellington are true, so that direct routes and comparative proximity may be readily estimated. The broken line encloses the hemisphere centred on Wellington, an examination of which demonstrates clearly the relative isolation of New Zealand and the stepping-stone route to southeast Asia. To the northwest the Asiatic mainland with its marginal seas and island arcs is nearer than North America or South Africa, and Australia and the East Indies alone stand between New Zealand and Asia. Again, it may surprise most people to discover that the estuary of the Plate River, and Buenos Aires, are nearer than San Francisco or the Panama Canal Zone. The map vividly illustrates, too, the five sea gateways into the Pacific. To the north the Behring Strait is of little value, whilst to the south are the routes via the Cape of Good Hope and Cape Horn, both of which entail for shipping a deviation round the south polar ice cap. Few ships today use the Cape Horn route because of its dangers and lack of trade, but the other is followed by many regular steamship lines. That South Africa is a dominion of the British Commonwealth of Nations is not without significance.

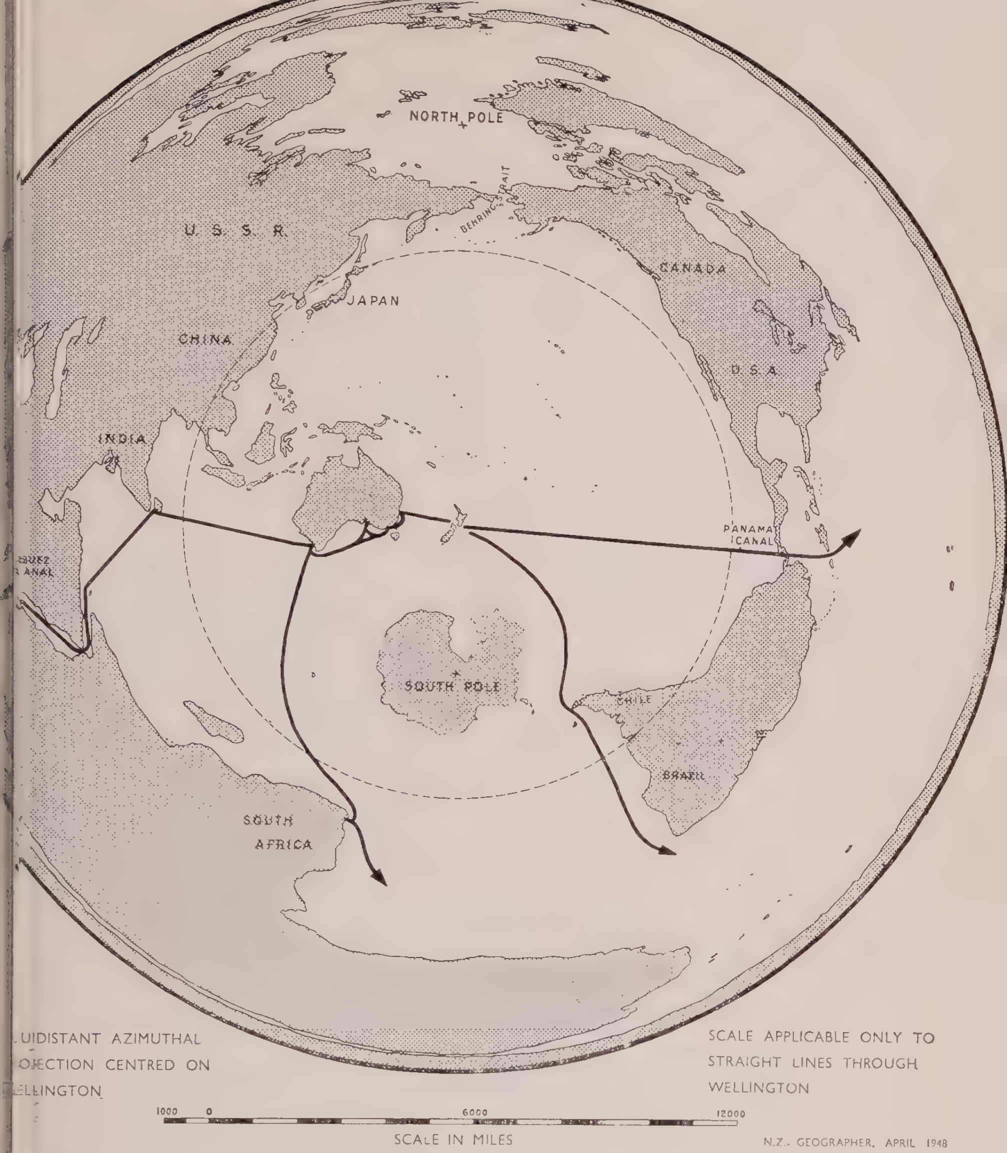


Fig. 1. The Sea Gateways to the Pacific Ocean.

The two remaining gateways are artificial, the Panama and Suez Canals, and as such are subject to political control. At any time, if the necessity arose, they could be closed and the most direct sea routes to Britain thereby severed. If naval power is to have any meaning in future conflicts, it is essential that the control of these two canals should never fall into unfriendly hands. In like manner, if air power and guided missiles are to be the dominant factors in future war, New Zealand and Australia must guard the approach to their shores along the island arcs of the East Indies and of the Pacific itself. The point may be put another way. If the future world power is to be centred on the Eurasian land mass in general, or in south and southeast Asia in particular, then Australia and New Zealand together must evolve a constructive policy within both their own and their Pacific territories. Moreover, there must be close cooperation with Britain and the United States, for under present conditions Australia and New Zealand, without outside help, tend to be power vacuums; and with Britain more immediately concerned in her own salvation and the balance of power in Europe the links with the North American continent must, of necessity, be strengthened.

Bases of Power

It is reasonable under these circumstances therefore, to conclude that any future threat to peace in the Pacific region—and in the world, since the problems of peace are now world-wide—will come from the northwest where power potentials may be greatest. These power potentials are based on the geographic factors of world and regional location, size and population, surface configuration, and natural resources; which, together with the ability of a people to take advantage of these factors, individually and totally determine the status of any nation in the hierarchy of powers. 'World location determines the climatic zone and thereby the economic structure, and regional location defines potential enemies and allies, and perhaps even the limits of a state's role as a participant in a system of collective security'.[1] Surface configuration plays an important part since by it will be influenced such factors as easy access to the sea and within a state, natural frontiers and the development of unity or provincialism. Yet size and population, together with natural resources, are perhaps the chief considerations in defining a nation's power in the world.

Table I summarises, from the standpoint of agriculture, the power potentials of the most important Pacific countries. In the first group are China, U.S.A. and Australia, which are comparable in areal extent—though it must be acknowledged that approximately forty percent of Australia is classed as agriculturally unproductive land at the present time. It is obvious that China with 1,485 people per square mile of cropland and 894 per square mile of total cultivated land is greatly overpopulated, whilst Australia with 187 and 4 persons respectively offers areas of potential closer settlement. The high percentage

---

[1] N. J. Spykman: *The Geography of the Peace*, New York, 1944. The work of the late Professor Spykman is perhaps the most significant contribution to the political geography of the Pacific in recent years, and the inspiration of the present article.

TABLE I

THE SIZE, POPULATION AND AGRICULTURE OF PACIFIC POWERS

	Group I			Group II		Group III	
	China (excluding Manchuria and Outer Territories)	U.S.A. (Excluding Alaska)	Australia	Japan Proper	New Zealand	U.S.A. and Canada	U.S.S.R. (1939 Territory)
a (in millions of square miles) ..	2.903	2.977	2.974	0.147	0.103	6.439	8.173
ulation (in millions)	422.7	141.3	7.448	73.11	1.769	152.8	185.9
entage of total area under crops ..	27[1]	19.1	1.33	15.6	2.99	10.3	11.6
entage of total area under pasture	4.6[1]	37.2	55	8.7	48	19.5	18.8
entage of total area under forest ..	8.7[1]	31.3	1.02	54.5	19.3	33.5	37.8
ulation per square mile of cropland	1485[1]	249	187	3165	571	231	195
ulation per square mile of total cultivated land, including forest ..	894	51	4	580	25	36	33
entage of population engaged in primary occupations	85	23.9	20.9	51.3	26.4	24.6	75
entage of population engaged in secondary occupations	★	28.9	32.1	19.2	25.2	27.9	★

Estimates not available.

hese figures are taken from J. L. Buck: *Land Utilisation in China*, Chicago, 1937 and refer to gricultural China, area 1.358 million sq. miles. (Other sources used here include: The *States-an's Year Book*, 1946, and K. J. Pelzer: *An Economic Survey of the Pacific: Part I, Population and and Utilisation*, New York, 1941.)

TABLE II

ER CAPITA PRODUCTION IN BASIC INDUSTRIES OF PACIFIC POWERS★

	Group I			Group II		Group III	
	China (excluding Manchuria and Outer Territories)	U.S.A. (Excluding Alaska)	Australia	Japan Proper	New Zealand	U.S.A. and Canada	U.S.S.R. (1939 Territory)
al	★ ★	3.54	1.7	0.76	0.71	3.34	0.96
n Ore (metallic content) ..	★ ★	0.29	0.22	0.007	★ ★	0.288	0.081
iron and Ferro-Alloys ..	★ ★	0.33	0.18	0.036	—	0.31	0.087
el	—	0.46	0.19	0.08	—	0.44	0.11

this table the figures are based on totals given in the *Statistical Year Book of the League of Nations.* he 1940 totals are set against the 1939 populations, except in the case of Japan where the 1937 oduction figures are the latest. Production is in metric tons.

Production insignificant.

of pasture land in Australia is indicative of the dispersed settlement pattern, especially when it is realised that almost fifty percent of the population is to be found in the five state capitals. In China less than twenty-five percent is urban, and that figure includes a large proportion of the population which is agricultural and lives in market towns.

The development of basic industry in China, as shown by Table II, is negligible, but is remarkably high in Australia, although Australia's per capita output is small compared with that of the United States.

TABLE III

PRODUCTION BY VALUE AND INCOME (U.S. DOLLARS)

	GROUP I			GROUP II		GROUP III	
	CHINA (excluding Manchuria and Outer Territories)	U.S.A. (Excluding Alaska)	AUSTRALIA	JAPAN PROPER	NEW ZEALAND	U.S.A. and CANADA	U.S.S.R. (1939 Territory)
Agricultural productivity per man on the farm	46	661	1542	120	2444	658	88
Real production per worker in secondary industry . .	* *	2380	925	* *	1885	2396	* *
Income per capita . .	51	541	397	91	465	539	101

* * Values not given. By estimation that of Japan is a little under 600.

The standard of living in China is low, being at mere subsistence level, so that the large population in itself does not constitute an actual source of power. On the other hand, that in the United States does since it is backed by high technological development and industrial output. (See also Table III.)

In the second group Japan and New Zealand are placed side by side, and comparison again brings out the overpopulation in agricultural Japan and the relative emptiness of pastoral New Zealand. Moreover a population of 580 per square mile of land under cultivation in Japan is to be correlated with an industrial capacity not greatly behind that of the U.S.S.R. as far as per capita production is concerned. Finally in the third group North America and the U.S.S.R. are contrasted. It is significant that the U.S.S.R. is still primarily an agricultural country with a per capita production in the basic industries lower than that of Australia. The power of the U.S.S.R. lies in the future, in the vast resources, the increasing industrialisation, the rapidly growing population and the steady expansion eastwards.

Table III is an abstract of figures given by Huntington.[2] It emphasises more vividly that China and Japan are poor countries both agriculturally and industrially, that the new countries of the world are the richest, and that New Zealand and Australia are preeminent as regions of high agricultural production and do not lag far behind in secondary industries. A New Zealand farmer produces per year twenty times as much in value as a Japanese farmer, or almost thirty times as much as a farmer in the U.S.S.R. Moreover his compatriot in secondary industry vies with the workers of the United States and Canada in the value of his output, which is three times as great as that of a Japanese industrial worker. From the point of view of per capita annual income, New Zealand in the period 1930-1935 (which Huntington studied) held fifth place after U.S.A., Canada, Great Britain and Switzerland, and immediately ahead of Australia. China, Japan and the U.S.S.R. were again far behind.

The explanation lies in the high technological development of the newer countries where machinery has been utilised to the fullest extent. Added to this are the factors of sparse population and a generally suitable climate, healthy vigorous peoples and a standard of living the envy of the world. No wonder then that the more progressive south-eastern Asiatics, condemned to a life barely above subsistence level and to labour in crowded lands, view the relatively empty spaces of Australia with longing, and demand, in effect, *Lebensraum*. The pressure at the moment is economic, but if, in the future, a militant missionary faith imbues a relentlessly expanding population with the desire to seek new lands, a violent political agitation will ensue. The empty lands of the East Indies and Australia may even become a *casus belli*. By that time the power potentials of the Pacific nations may have changed from those indicated by these three tables. Today the United States, Canada, Australia and New Zealand are the great nations, though the populations are not large enough except in the first. China and Japan, as they are at present constituted, possess much smaller potentials, as does the U.S.S.R. But the Russians have made tremendous advances in the last ten years, so that with the rigidly planned economy which is peculiar to them it is feasible that power potentials will increase more rapidly there than in any other state in the Pacific area—or, for that matter, in the world.

The future of the Pacific, then, is linked intimately with the balance

---

E. Huntington: The Geography of Human Productivity, *Annals of the Association of American Geographers*, Vol. XXXIII, No. 1, March 1943.

between East and West, between the Eurasian and North American land masses, and between peoples which exist at subsistence level and nations striving to maintain a high standard of living. Eurasia produces 62.5 percent of the world's hard coal, 56 percent of its pig iron and ferro-alloys, and 61.2 percent of the steel, whilst the Western Hemisphere produces 35 percent, 41.6 percent and 37.9 percent respectively. In Australia the output is small even though the per capita figure may be large, for there is an insufficient population to create a power potential. The contrast between the east and west margins of the Pacific is again exemplified by the fact that eighty-one percent of the total population in the countries adjoining that ocean is to be found on the Asiatic side, eighteen percent on the American side and one percent in Australia, New Zealand and the island groups.[3]

POPULATION PRESSURE

One of the greatest dangers to economic stability and world peace is the differential growth of population, especially in south and southeast Asia, where there is an average increase of fifteen percent in overall totals every ten years. If the populations of the West remain relatively stationary, increased numbers and industrialisation in the East will create a demand for expansion. As Warren S. Thompson has pointed out,[4] it is not the actual numbers which cause the pressure, rather is it the development of felt needs and the realisation that pressure does exist. These are the results of an increasing industrialisation which raises the national existence above subsistence level, and at the same time produces the need for a greater share in the world's resources—with which the standard of living could be raised even higher. If this greater share is not forthcoming, it must be taken by force.

Such was Japan's creed, and such may be the excuse of the peoples of southeast Asia again if the resources and the unsettled areas of the Netherlands East Indies are not for them to exploit. Beyond the East Indies lie Australia and New Zealand, sparsely peopled, and incompletely and wastefully developed by nations unwilling to admit others with lower standards of living who would farm the land more intensively.

Within southeast Asia there is at the moment unused land in the Netherlands East Indies, the Philippines and Indo-China, but sufficient only to absorb the natural increase in population during the next fifty years. The excess numbers in China, Japan, and India too, must find economic outlets for their expanding energies or spaces for their increasing numbers, either in these unoccupied lands or beyond. In any case war might well rage over the marginal lands of Asia and the Asiatic mediterranean to establish the right of people to settle and develop territory by their own labour and not to remain condemned to a bare existence. And conflict in the Asiatic rimland or mediterranean must involve the great powers, either to protect their own interests, or to redress the balance of power to their own advantage.

---

[3] K. J. Pelzer: *An Economic Survey of the Pacific; Part I, Population and Land Utilisation*, New York, 1941.

[4] W. S. Thompson: *Population and Peace in the Pacific*, Chicago, 1946.

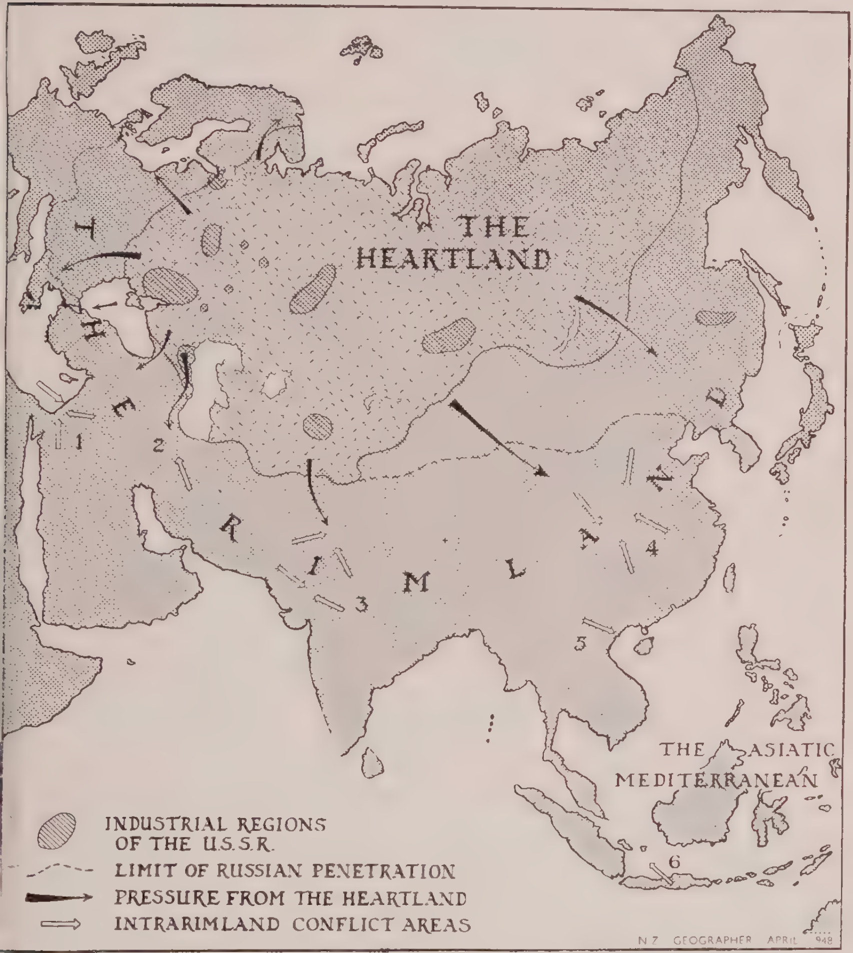

THE HEARTLAND
R I M L A N D
1
2
3
4
5
6
THE ASIATIC MEDITERRANEAN
INDUSTRIAL REGIONS OF THE U.S.S.R.
LIMIT OF RUSSIAN PENETRATION
PRESSURE FROM THE HEARTLAND
INTRARIMLAND CONFLICT AREAS
N Z GEOGRAPHER APRIL 1948

Fig. 2. The Heartland and Rimland. Areas of intrarimland conflict are: 1. Jew v. Arab; 2. Iranian v. Russian; 3. Moslem v. Hindu; 4. Communist v. Nationalist; 5. Tonkinese v. French; 6. Javanese v. Dutch.

Heartland and Rimland

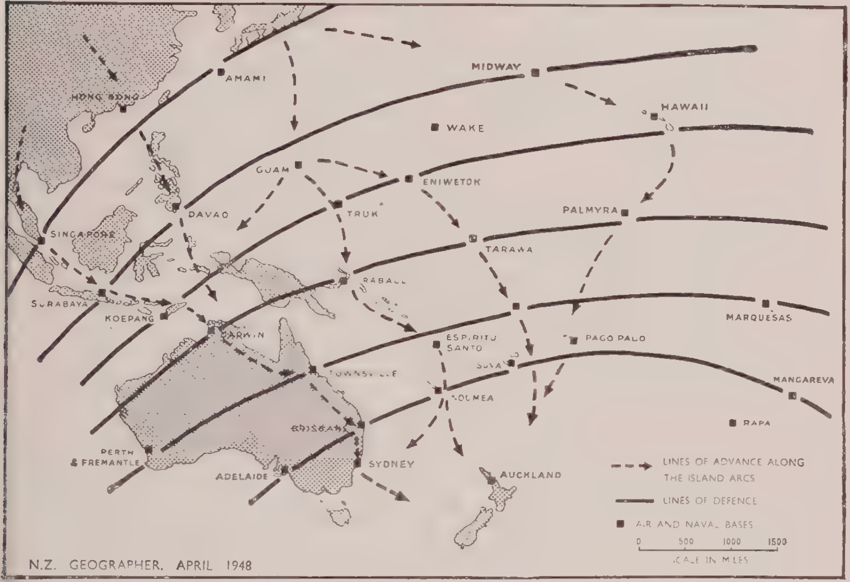
It was Sir Halford Mackinder who first put forward the concept of the heartland—the vast area of Russia draining towards the Arctic Ocean and the inland seas, where the development of national strength would have no relation to sea power. Round this pivot area, beyond the almost encircling mountain barrier, is the marginal crescent of states and mediterranean seas, which Spykman has called the rimland. Whilst the heartland may be correlated closely with the political extent of the U.S.S.R. the rimland is divided into a complexity of states, none of which is dominant—although Germany has tried twice within thirty years to establish hegemony in the west, and Japan once in the east. There are apparently two aspects in the struggle for power; firstly, within the rimland where the balance of power must always be the paramount question; and secondly, the conflict between the heartland and the rimland.

The map (*Fig.* 2) shows the main zones of internecine struggle. Europe is divided into two camps by the interests and ideologies of the Soviets on the one hand and the United States and Britain on the other. A major clash between Arabs and Jews in Palestine seems inevitable, whilst in Iran the fight for oil again brings the Western Powers face to face with Russia. India is torn with internal dissension, and Burma and Indo-China with civil disturbance. The Indonesian question is far from being settled, and in China war still ravages the countryside.

Thus in the rimland facing Australia and New Zealand there is at present inadequate security. It is in the interests of New Zealand and Australia that solutions to the problems involved should be found as soon as possible—for two reasons. Firstly, to have any influence in rimland affairs the offshore islands must be amicably disposed, since there will be located the forward air bases and naval stations. These conditions will not obtain if independence in Java is won by force of arms, or if the islands have been forcibly occupied by outward-moving populations. Secondly, intrarimland conflict provides a convenient excuse for interference by the heartland power.

The Menace of the Heartland

Throughout history pressure has been exerted outwards from the heartland, and is epitomised in Europe in the agelong struggle between Teuton and Slav. For centuries Russia has sought outlets to the sea, particularly to the Atlantic and the Mediterranean, and has aspired to penetration beyond the Himalayas. During the last twenty-five years she has pushed steadily eastwards towards the Pacific. Stage by stage the better agricultural areas of Siberia have been opened up, and the discovery of mineral resources has speeded the advance and reorientated the industrial organisation. Today the centre of Russian power is located near the Urals, and although European Russia remains the focus of agricultural activity, Siberia possesses the greater potential wealth. It may be that for several years to come the U.S.S.R. will concentrate on the rebuilding and more efficient development of the west, but with the steady growth of population towards the estimated 250 millions of 1970, the expansion must be eastwards. To follow Mackinder's theory, Russia will effectively rule east Europe and command the heartland, for from no other direction is penetration so easy; and, with the full development of her great power potential, will be in a position to interfere in the rimland. And with the final integration of Eurasia, both politically and economically, the world-island will command the world.



N.Z. GEOGRAPHER, APRIL 1948

Fig. 3. Pacific Island Lines of Defence.

At the present time the Soviets have a stake in east central Europe and in Manchuria, whilst pressure is being exerted in the outer provinces of China and in Iran. An India divided against itself invites intervention once the northern passes are open, just as in China in the past. The occupation of India or China, or of both, by the heartland power would endow the Asiatic mediterranean with an even greater significance in the strategy of the southwest Pacific, for there sea power and air power could be used to counter thrusts against Australia and New Zealand.

Counter Strategy

It would appear, therefore, that counter strategy must be based on two major precepts; firstly, the neutralisation of the threat from the rimland, and secondly, the establishment of a national security founded on an adequate population and an efficient utilisation of resources.

There are several aspects to the first problem. It is essential that no power in the rimland or offshore islands should be allowed to become preeminent and thereby bring the smaller nations within its orbit. The power of Germany and Japan has been broken, but they must not be permitted to degenerate into mere occupation zones with no future and a great past. It is conceivable that other nations in the rimland may aspire to greatness: China if she can secure unity, India if she can resolve her present difficulties, or maybe France under a totalitarian regime. Then will Germany and Japan be called in to redress the balance. It seems rather foolish to condemn Japan for pursuing, in the past, a policy which was essentially akin to that of Britain *vis-à-vis* the continent of Europe: that no great continental power should occupy the opposite shores of the marginal seas, and that the balance of power must at all costs be maintained. This has particular application if and when that policy may again be necessary in Asia.

On the other hand a union of all the states of southeast Asia would constitute a threat which could be effectively counterbalanced only by an alliance with the heartland power. The rimland would then have to contend with both military pressure from the heartland and naval power on the littoral.

The greatest danger is the breaking through of the heartland power to dominate the rimland and marginal seas. Naval strength in these seas is no longer effective unless supported by adequate air forces which may be either land or carrier based. Land based aircraft are more efficient, except under special conditions, so that any Australian and New Zealand defence scheme must envisage series of island bases which would constitute lines of defence across the zones of possible enemy advance (*Fig.* 3). Air power in its various forms must be the basis of future strategic planning, with naval power playing a secondary role. On these grounds the division between the heartland and the offshore continents and islands on the basis of land versus sea power is not as clear-cut as Mackinder stated, since both must depend on air power to a major extent. The deployment of this air power will be easiest across the mediterranean seas, and possibly across the north polar ice cap, with the heartland possessing the advantage of interior lines of communication. Australia and New Zealand will be responsible for the Asiatic mediterranean while Britain concentrates on western Europe and the United States on the north Pacific and the Arctic.

That operations within the Asiatic mediterranean will be hindered by the lack of cooperation from the island peoples goes without saying. Therefore, if the population in this area is to be increased by immigration, it is preferable that the controlling powers select the settlers rather than accept them under duress. This implies a re-orientation of policy, for closer settlement entails the abandonment, in large measure, of the plantation system and 'colonial' exploitation. In Indonesia more than 500,000 square miles are lying idle which could be efficiently utilised by friendly Asiatics who would settle there as farmers.

Similarly the empty tropical lands of Australia must be occupied before the outward expansion of Asiatic peoples produces an undesirable infiltration. Yet if Australia is to maintain her 'white' supremacy in population, closer settlement of the rest of the country must be encouraged. With this end in view, the immigration of European peasants must be accepted as inevitable, for British immigrants have the same standards of living as Australians, and would not welcome the idea of pioneer farming. European peasants would live off the land and be willing to raise their standards gradually. To confine immigration to British peoples solely would not lead to more intensive settlement, for Australian farming is highly commercialised and is at the peak of development in that form. The result would be merely an increase in the already topheavy urbanisation.

NEW ZEALAND'S TASK

In New Zealand, although there are no tropical areas unsuited to white settlement, the position is comparable, and it has been claimed that the need for pioneer farmers is just as great. More so than Australia, New Zealand is a primary producing country and future wellbeing is very largely bound up with the more efficient exploitation of primary resources. Secondary industry is largely artificial and dependent on political sustenance, so that to import artisans and the like is merely to perpetuate an uneconomic condition. The closer settlement of existing farmland, the opening up of poorer areas by pioneer farmers, and a greater overall attention to land problems in general—there lies New Zealand's answer to possible domination from without. If the combined populations of Australia and New Zealand are to remain at about the ten million mark, the two countries must be prepared to withstand the onslaught of land-hungry Asiatic peasantry, for, as Thompson says, there is not enough land in the Pacific region to accommodate the 2,000 million people who would result from a fifteen percent decennial increase in the next fifty years.

Moreover, Australia and New Zealand must be prepared to stand alone if need be. There must be unity of action in all questions appertaining to the future welfare of the southwest Pacific—the development of resources, immigration, the integration of economic life, island territories and defence. Such unity is implicit in the establishment of the South Pacific Commission by Australia, New Zealand, the United States, Britain, the Netherlands and France, with the object of furthering the development of the non-selfgoverning territories of the signatory nations in the light of coordinated research in the fields of agriculture, economic life and social welfare. But in sharing this burden New Zealand must not disregard the broader issues. Mackinder said that 'democracy refuses to think strategically unless and until compelled to do so for the purposes of defence'. Now is the time for New Zealanders to think, if they wish to preserve their way of life. A wider understanding of world affairs, a global viewpoint, is needed; not merely a consideration of New Zealand and, perhaps, the British Empire. Complacency and selfishness must be abandoned in the face of so much misery in the world and of the necessity for closer settlement at home. If one hundred years of honest endeavour are to be sacrificed, let it not be said that they were sacrificed on the altar of Mammon.

LAND SETTLEMENT IN NEW GUINEA*

ROBERT G. BOWMAN

FOUR HUNDRED and twenty years have passed since the Portuguese navigator, Jorge de Meneses, became the first European to look upon the palm-fringed shores and jungle-clad mountains of New Guinea, the world's second largest island. Since that time four Western powers (Germany, Great Britain, the Netherlands and Australia) with advanced technological skills and considerable experience in tropical settlement have laid claim to parts of the island and established small colonies there. Two of these powers, Germany and Great Britain, have relinquished their holdings to Australia which now shares dominion over New Guinea with the Dutch. During this period of white occupation, New Guinea has contributed a variety of products to the Western world, including gold, copra, pearls and pearl shell, tortoise shell, gum copal, cacao, rubber, birds-of-paradise feathers and valuable tropical hardwoods. Lead, zinc, silver, graphite, copper and osmiridium have also been mined in small quantities, coal has been picked up in several stream beds on the island, and oil has been discovered in recent years in the western and north central parts of New Guinea. Agricultural experimental stations, commercial plantations, army farms and native gardens have demonstrated that nearly every kind of commercial and subsistence crop can be grown in one part of the island or another. Good natural harbours are available at several points, constructional materials are abundant, and the hydroelectric power potential is probably as great as or greater than that of the entire continent of Australia.

In spite of this New Guinea today remains imperfectly explored and on the whole very sparsely populated. It is estimated that the native population scarcely exceeds a million and a quarter, while the white residents number only 5,000, giving an average density of about four persons per square mile. Most of the natives have a level of culture that is not advanced much beyond that of our own Neolithic ancestors

---

*This is a condensed version of a report entitled *Prospects for Land Settlement in Northeastern New Guinea*, prepared in 1946 by the writer for (and at the request of) the Refugee Economic Corporation of New York. This condensed report is published here with the permission and by courtesy of the Corporation.

10,000 years or so ago, and although a few modest fortunes have been made by whites engaged in gold mining, trading and plantation agriculture the standards of living of most whites in New Guinea are not to be compared with those of advanced Western countries. At times in the past various administrations have issued attractive posters, bulletins and handbooks designed in part to attract settlers to the island. Tourists have been lyric in their praise of its scenic attractions and some peripatetic anthropologists have stressed the fascinations of native life. Yet if you talk with some of the half-million soldiers who were stationed briefly in New Guinea during World War II you are apt to get a very different point of view—one usually punctuated by vigorous Aussie or Yank expletives! In their opinion, and in that of hundreds of temporary sojourners on the island, New Guinea is the last stepping stone on the trail to the nether regions.

Other Views of New Guinea's Prospects

By way of illustrating the divergent views that are held about future development in New Guinea, let us consider what a few specialists have written in recent years. Marr[1], an agriculturalist, states with reference to the Markham and Ramu valleys in northeastern New Guinea (*Fig.* 1) that 'This tract of country . . . appears from many points of view to be one of the most promising in the Territory of New Guinea . . . the Markham and Ramu valleys have a healthy climate suitable for white settlers, a soil of great potential fertility, and a climate suitable for the grazing and fattening of cattle'. Roberts[2], an historian, writes, 'Neither colony . . . [neither Papua nor ex-German New Guinea] . . . has developed its production to anything approaching the limit, and the cultures other than copra are in their infancy. The difficulties are lack of capital and shipping rather than a shortage of labour, so far as the European is concerned.' Reed[3] regards the cool and relatively dry uplands of New Guinea as 'well-adapted, biologically at least, to further white settlement.' Krieger[4], an American anthropologist, says of New Guinea that 'its resources are almost entirely undeveloped.'

---

[1] Colin C. Marr: 'An Agricultural Survey of the Markham Valley in the Morobe District.' *New Guinea Agricultural Gazette*, Vol. 4, No. 1, January 1938, p. 2.

[2] S. H. Roberts: *Population Problems of the Pacific*. London, 1927, p. 267.

[3] S. W. Reed: 'The Making of Modern New Guinea.' *Memoirs Amer. Philos. Soc.*, Vol. 18, 1942.

[4] Herbert W. Krieger: *Island Peoples of the Western Pacific, Micronesia and Melanesia.* Smithsonian Institute, War Background Studies, No. 16, 1943, p. 61.

Wood[5], an Australian economist, writes in still more enthusiastic terms: 'Much splendid alluvial land of enormous fertility exists along the coasts and river valleys . . . the island abounds in plants and timbers of a high economic value, but no serious attempt has yet been made to exploit or even survey the great resources of New Guinea . . . more than 120 varieties of useful timber are known to exist . . . the immensely fertile valleys and plains afford great possibilities for the development of tropical agriculture. By reason of the distribution of good soils at varying elevations, every tropical commercial crop can be grown in the island.' (He adds that although coconuts, rubber, and sisal hemp are the main plantation industries so far established, coffee, cotton, vanilla, kapok, cacao, tapioca, cinnamon, tea and tobacco are all being grown 'successfully', although their culture has not yet been attempted on a large scale.) Keesing[6] likewise asserts that the agricultural opportunities in New Guinea 'far exceed present utilisation' and goes on to say that 'this applies not only to tropical products but also to those characteristic of temperate areas which, it has been demonstrated, can be grown on the plateaus and higher slopes.' Lee[7], an Australian physiologist, reports that 'two . . . places struck me as giving a very direct lie to popular conceptions of steaming jungles and malarial swamps . . . [the Markham valley and the open, grassy terraces on the northeast side of the Huon peninsula] . . . the climate was delightful . . . the Markham valley . . . has great possibilities . . . Our tropical regions can be inhabited and developed by white men, but only if they play the game by biological rules . . . if we [Australians] . . . do not develop the tropical islands under our jurisdiction in the next fifty years . . . the non-Caucasian will, and not for us.' Referring to the tropics in general Sinnott[8], a professor of botany for thirty years, and now Director of the Sheffield Scientific School at Yale University, contends 'We shall more and more use the synthetic ability of plants, not simply for foods or for specific industrial materials but for those simple and really basic raw materials like sugar, starch, cellulose and proteins from which the industrial chemist can, in turn, make so much . . . the tropics, with their high temperatures and other favourable conditions for plant growth, will more and more attract the attention of producers for agriculture and industry.'

---

[5] Gordon L. Wood: *The Pacific Basin.* Oxford, 1941, pp. 82-84.

[6] F. M. Keesing: *The South Seas in the Modern World.* New York, 1941, p. 37 and p. 330.

[7] Douglas H. K. Lee: Written communication, October, 1946.

[8] Edmund E. Sinnott: 'Plants Hold the Basic Patents' in *Serving Through Science*, U.S. Rubber Company, 1945.

AN AUSTRALIAN COMMENT

Elkin[9], an Australian anthropologist, is less optimistic about New Guinea's prospects. He writes: 'White development, particularly of the land, has not been pushed to any great lengths, and that for two reasons: government restrictions in the interest of the natives, and a lack of desire or need on the part of many whites to work or venture in these tropical lands . . . Several factors have contributed to what may seem slow development. The Administrations have exercised restraint in alienating land from the natives' own use, for their interest has been regarded as primary in this regard. But even so, much more land has been available for non-native use than has been utilised . . . in the Mandated Territory, up to 30th June, 1939, 657,199 acres of land had been granted to non-natives for agricultural purposes, but only 40 per cent of it is in use. The reasons may be found in the uncertainty of obtaining sufficient indentured or casual labour, the uncertainty of finding satisfactory markets, the slow initial return on tropical crops, and the unattractiveness of a tropical island climate to Australians, who, in any case, are not crowded out of their own country by over-population . . . Increased development of the Territories by indentured labour is out of the question . . . the policy of establishing returned soldiers in a native territory, Papua, was tried out after the last war. It was an ignominious failure . . . There may be some reasonably large areas of suitable land which the natives themselves will not use for generations to come . . . [but] . . . while much of New Guinea is not thickly populated, much of the land is of poor quality . . . Some people in Australia and abroad have gathered the impression from explorers' reports that the highlands of the interior of New Guinea . . . present a great opportunity for white settlement in a pleasant climate, with, of course, native labour available . . . [but] . . . much of it is extremely mountainous and too rough for white settlement . . . there are areas which may be suitable for tea and other products . . . these desirable regions are thickly populated . . . it is doubtful if it would be economically possible for Europeans to develop the area . . . the area of apparently useful farming land is only about 10,000 square miles, and this already carries a fairly dense population . . .'

Here we have a variety of opinions as to the habitability and productivity of New Guinea. Clearly the island has its boosters as well as its disparagers, like most other parts of the world. Is there any basis at present for obtaining a balanced judgement on New Guinea's prospects, or for determining which parts of the huge island, if any, would be worth scouting for future agricultural opportunities? Let us first consider what past failures in colonisation there tend to show.

---

[9] A. P. Elkin: *Wanted—A Charter for the Native Peoples of the Southwest Pacific.* Austr. Publ. Co. Pty. Ltd., Sydney, 1943, p. 62 and p. 29.

The Lesson of Earlier Failure

Efforts to colonise New Guinea with white people obviously have met with negligible success up to the present, measured in terms of the area of land brought under cultivation, the numbers of white settlers on the land, and the wealth that has so far been created by agricultural activities. Failures have been numerous and as many prospective settlers have left the island after a few years as have remained behind. What explanations can we find in the records of these attempts? Some of them, whether or not they bear the stamp of official recognition, are as follows:

(1) The Western powers which have controlled New Guinea during most of the past century have all been preoccupied with settlement in other lands, both temperate and tropical. The Portuguese were in no position to follow up their initial discovery of the island with land settlement, partly for political reasons and partly because they were already spreading themselves thinly in two hemispheres. Their attention in the southwest Pacific was concentrated on the Spice Islands west of New Guinea. The British and Germans had colonies in Africa and elsewhere that absorbed much of their attention, and also were diverting most of their energies and resources toward strengthening their economic and political positions in Europe during the time that they held colonies in New Guinea. The Dutch throughout have lacked the population, capital, and incentive for intensive development of their half of the island, and have devoted most of their energies to the colonisation of Java, Sumatra and Borneo, with little to spare for other parts of *Tanah Sabrang* or the 'Outer Provinces' of the Netherlands East Indies. And Australia, with a population of only seven and a half million on a continent covering nearly three million square miles, and with insufficient resources for the full development of the mainland, is in no position to invest heavily in colonisation ventures in remote tropical colonies.

(2) Colonisation efforts in the past, such as the plantation enterprises of the British and, later, the Australians in the vicinity of Port Moresby, of

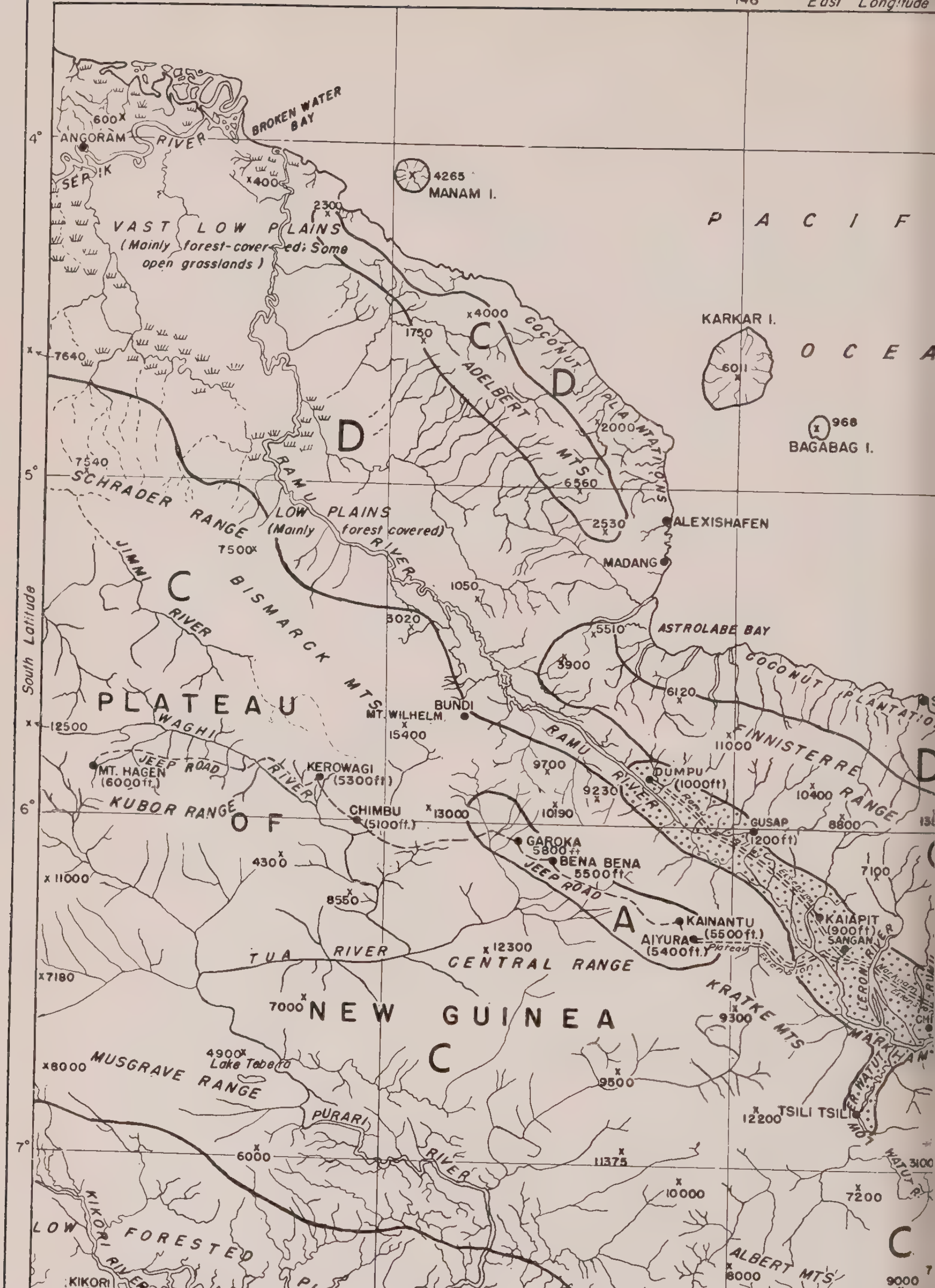
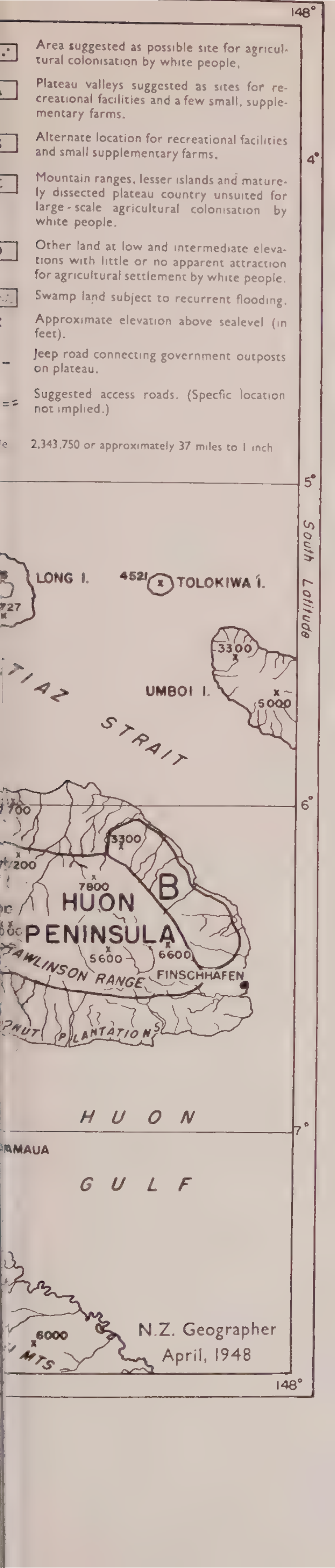


Fig. 1. Part of Northeastern New Guinea. (Prepared by Robert G. Bowman an
reproduced here by courtesy of the Refugee Economic Corporation of New York.
Mercator projection: the scale quoted is the equatorial scale


148°
Area suggested as possible site for agricultural colonisation by white people,
Plateau valleys suggested as sites for recreational facilities and a few small, supplementary farms.
Alternate location for recreational facilities and small supplementary farms.
Mountain ranges, lesser islands and maturely dissected plateau country unsuited for large-scale agricultural colonisation by white people.
Other land at low and intermediate elevations with little or no apparent attraction for agricultural settlement by white people.
Swamp land subject to recurrent flooding.
Approximate elevation above sealevel (in feet).
Jeep road connecting government outposts on plateau.
Suggested access roads. (Specfic location not implied.)
2,343,750 or approximately 37 miles to 1 inch
4°
5°
6°
7°
South Latitude
LONG I.
4521
TOLOKIWA I.
3300
UMBOI I.
5000
STRAIT
3300
7800
B
HUON
PENINSULA
5600
6600
RANGE
FINSCHHAFEN
PLANTATIONS
H U O N
G U L F
6000
MTS
N.Z. Geographer
April, 1948
148°

the Germans on the Huon peninsula, and of the Dutch at Hollandia and in the Merauke region, have all been small-scale attempts lacking adequate capital investment. No detailed soil surveys were made in advance and little was known about the weather and climate of these areas prior to settlement. Almost no transportation and communication facilities were provided in advance, nor, for that matter, storage and handling facilities, essential medical and educational benefits, and in general most of those amenities of civilisation desired or needed by modern pioneers. Many of the settlers were poorly equipped for life in the tropics, and were generally ignorant of the need for specialised diet, clothing and housing, or for proper hygiene, physical exercise and modified work schedules.

(3) The economic basis of life among white peoples in New Guinea from the earliest days of European colonisation has been the plantation, mining and trading, rather than intensively cultivated and broadly diversified small farms worked by their owners. This has not favoured the growth of a large resident white population nor the development of a local market.

(4) Native labour has been hard to obtain, inefficient and on the whole undependable. So far little has been done to substitute machinery for native labour in the plantation enterprises in New Guinea (as in Hawaii and Queensland) and few white settlers have shown any inclination to perform physical work of a regular nature.

(5) Plantations in New Guinea have specialised in crops that could be more

easily and more cheaply produced elsewhere in the tropics. The rubber plantations, for example, have been unable to compete on equal terms with those of Malaya and the Netherlands East Indies because of labour difficulties in New Guinea and because the production of crude rubber per acre is but a fraction of that obtained from trees in the Dutch and British areas that have been propagated from high-yielding varieties hitherto unavailable in New Guinea.

(6) The lowland areas so far selected for white settlement have an unpleasantly warm, humid climate, and no real effort has yet been made to develop recreational facilities for white settlers in the adjacent highlands where the climate is invigorating.

(7) Medical facilities in New Guinea, with few exceptions, have been primitive, and quite out of gear with the needs of both the white and native populations.

(8) Mosquitoes, flies, leeches, fleas and rats are ever-present nuisances in New Guinea, and often carriers of disease. Little has been done to exterminate them in the settled areas or elsewhere.

(9) Government restrictions on the methods of recruiting native labour and the working and living conditions where natives are employed have benefited the native but severely limited the profitability of plantation enterprises.

(10) The 'White Australia Policy' has discouraged the bringing in of coloured migrants from southeast Asia to provide an adequate supply of cheap labour for increased developments as was done in Fiji and New Caledonia, for example, where Hindus and Javanese were brought in to work mines and plantations. Government regulations have also restricted the types of activities in which white settlers might engage, the areas in which they might operate, and the channels through which they might dispose of their produce.

(11) The view that most newcomers have held upon their arrival in New Guinea—that their stay is temporary and that as soon as their term of service is completed, or as soon as their fortunes are made, they will return to their true 'homes'—has been a psychological barrier to successful colonisation. The supposed need for white settlers in tropical regions to return frequently to temperate lands for 'cooling off' periods, and to leave permanently after twenty or thirty years, has militated against the proper frame of mind for successful white colonisation in New Guinea.

It is impossible to assign failures in New Guinea to one or even any specific combination of these causes. All have played a part at times, in places, and in the case of individuals and groups. Much the same obstacles confront future settlement in the island. Yet it would be absurd to 'write off' New Guinea as a land without prospects for further white colonisation on the basis of past failures alone, especially since many of them occurred in the period that Price[10] has called the period of 'prescientific invasions of the tropics.' New Guinea today is still very much of an unknown quantity, and the current need is for more knowledge about the island and less conviction. On the basis of our present incomplete knowledge of the island, about all we are justified n assuming is that it is neither a land of unlimited opportunity that for some mysterious reason has thus far escaped the attention of advanced Western cultures, nor a land where opportunities are completely acking. Parts of it have been tried and found wanting, and are likely o remain so. But history alone offers no substantial proof that further white settlement is impossible or impracticable.

With such information as we now possess about New Guinea, however, it should be possible to assign priority both as to the most udicious locations for further studies and the specific nature of the investigations that need to be made.

The Future: Dutch New Guinea

It would seem that the Dutch, on the whole, hold what might be rmed the 'short end of the stick' in New Guinea. If we exclude from onsideration the parts of Dutch New Guinea that are obviously nsuited to agricultural colonisation by white people because they are oo mountainous, too swampy, too infertile, too disease-ridden, or too hickly populated by natives, it becomes apparent that there is very ittle land left in Dutch New Guinea that would be attractive either for lantations or for small farms owned and operated by whites. Some uitable land might yet be found on the southern shores of Geelvink ay, where a few small plantations were developed by Japanese shortly efore World War II, or in the Merauke area, but preliminary soil urveys in the latter area suggest that most of the soils are poor.[11] eavy rainforest or swamp forest covers most parts of the lowlands, e former also prevailing on most of the hill slopes and wetter mounain slopes. Only soils of exceptional fertility would seem to justify

---

A. Grenfell Price: *White Settlers in the Tropics.* Amer. Geogr. Soc. Spec. Publ., New York, 1939.

Karl J. Pelzer: *Pioneer Settlement in the Asiatic Tropics.* Amer. Geogr. Soc. Spec. Publ. No. 29, New York, 1945, Appendix B, pp. 249–252.

the high costs of clearing, draining, cultivating and providing adequate transport facilities for such land, and soils of this type appear to be lacking in most parts of Dutch New Guinea. Javanese subsistence farmers may one day be able and willing to make use of some of these lowlands for *sawah* (wet rice) cultivation, but efforts to encourage migration of Javanese to New Guinea so far have met with practically no success.[12] The mountain areas in Dutch New Guinea contain little or no land that is likely to attract European farmers, despite the cooler climate of the higher elevations. Most of the land is very rough, densely forested, and inaccessible from the seacoast. The plateaus of the Vogelkop and Bombarai peninsula are limestone and in consequence deeply pitted and characterised by thin soils. In most areas the natives have already preempted the valley floors suitable for intensive cultivation.

It seems likely that future white settlement in Dutch New Guinea will follow the pattern of settlement up to the present: viz. scattered plantations on patches or strips of well-drained soil at strategic locations near the coast; administrative headquarters favourably located with respect to concentrations of natives; and temporary camps in the interior where mining or the extraction of forest products is taking place, or where oil fields are being developed commercially. These may justify the development of a few small farms or 'truck gardens' catering for the needs of the itinerant white population, but they will not provide a local market of any consequence or encourage large-scale white colonisation. Nor is there any use at present in speculating on the prospects for manufacturing, based on the development of water power resources in the Dutch half of the island. Opportunities for industrialisation are far more attractive in other parts of the world where cheaper forms of power are available, where skilled labour is obtainable in large quantities, and which are geographically better located with respect to channels of trade and markets.

Australian New Guinea

If we apply the same criteria for evaluating the prospects in the eastern half of New Guinea, (Mandated Territory and Territory of Papua), it becomes obvious that here, too, a large proportion of the total area is quite unfit for white agricultural settlement. Most of the interior is mountainous and where there are valley floors situated at altitudes of 3,000 feet to 7,000 feet above sea level with a temperate climate we find that they are already for the most part well-populated by native subsistence farmers. This is especially true of the long, broad valleys between Wau and Mt. Hagen in the Mandated Territory. Although recent government patrols have reported a number of valleys that are uninhabited or sparsely populated to the west of this region toward the Dutch border, they are all relatively inaccessible from the seacoast and many of them lie at elevations that are too high for intensive agricultural development and close settlement (above 8,000 feet). Much the same is true of the Owen Stanley range in the southeast, the Adelbert, Finisterre and Saruwaged ranges in the northeast, and the Bewani and Toricelli mountains in the northwest. In all these areas, with the exception of a few valley floors at intermediate altitude, the rugged terrain, heavy forest cover and wet climate preclude all but the most rudimentary forms of cultivation, and in the better valleys one usually finds natives already in occupation of the land.

---

[12] Pelzer, *op. cit.*

Because of poor drainage, infertile soils, dense forest cover, unpleasant climate, the prevalence of diseases or insects, and inaccessibility we may also eliminate most of the low-lying delta plains of the Fly river, the low Oriomo plateau in the southwestern part of Australian New Guinea, and the Sepik and Ramu drainage basins in the northern part of the island; at least until we get a much better idea of what these lowlands are like in detail. Descriptions of these areas in explorers' journals and in reports of government patrols suggest that they are thinly peopled for good reasons, and are likely to remain so for some time to come. Parts of them may be suitable eventually for wet rice cultivation, but this will require an enormous outlay of capital and labour, with intricate networks of canals, levees, dikes and terraces. They are all unhealthy and while approachable by way of the larger streams like the Fly (which is navigable by steam launch to a distance of 500 miles from its mouth) the best land appears to lie well back from the navigable waterways towards the margins of the lowlands.

There seem to be, however, four areas of 'relative desirability' in Australian New Guinea: (1) the coastal plains northwest of Port Moresby; (2) the Great Papuan plateau in western Papua; (3) the Buna-Collingwood plain southeast of Lae in the Mandated Territory; and (4) the Markham valley-Huon peninsula in the northeastern part of the Mandated Territory west and north of Lae, the capital. The first has a well-developed port and tracts of open or semi-open grassland, lies closest to Australian markets, is already the site of some plantation development and cattle grazing leaseholds, and has a relatively dry climate (favourable from the standpoint of human comfort, but less so from the standpoint of agricultural development, due to the need for supplementary irrigation for certain crops at times). The second has extensive tracts of volcanic soils, some of which may prove suitable for intensive agricultural development, and contains land at higher elevations where the climate is more temperate, but much of it is heavily forested and none of it is readily accessible from the seacoast. The third is low-lying, fairly heavily forested, and has a rather damp, hot climate, but contains extensive tracts of alluvial soils that are fairly well-drained, and on the whole is sparsely populated by natives making little or no use of much of the land. Farms located in this area during the war showed that the land was quite productive, but it cannot be denied that the climate of the region is enervating. The fourth area is the one that seems to hold the best agricultural opportunities in New Guinea and for this and other reasons is the one that is best suited, on the whole, for development by white people. It is therefore desirable that we consider this region in somewhat greater detail.

The Markham Valley

The Markham and Upper Ramu valleys form a continuous and impressive structural trough between Huon Gulf and the Sepik-Lower Ramu geosyncline. From either end of the trough the floor rises almost imperceptibly to a broad, low saddle about 1,200 feet above sea level in the vicinity of Gusap. The floor of the trough is about 200 miles long, varies in width from about four to ten miles, and is flanked by the towering Finisterre and Saruwaged ranges on the north (maximum elevation over 13,000 feet) and the Bismarck and Kratke ranges on the south (maximum elevation over 15,000 feet). The soils of the valley are developed for the most part on a deep alluvial base that represents the accumulated washings from the adjacent mountain slopes and, while comparatively stony in places—especially in the vicinity of the main rivers and their larger tributaries—they are normally deep, dark-coloured clay-loams that seem to be well supplied with humus. Farms established in 1944 in the vicinity of Nadzab and Gusap[13] for the purpose of providing fresh vegetables to military personnel demonstrated that high initial yields of a variety of both temperate and

---

[13] Robert G. Bowman: 'Army Farms and Agricultural Development in the Southwest Pacific.' *Geogr. Rev.*, Vol. 36, No. 3, 1946, pp. 433-437.

Fig. 2. Vegetables beside airstrip at Mt. Hagen, New Guinea, waiting for plane shipment to Nadzab in Markham valley 1944.

Fig. 3. Australian headquarters at Mt. Hagen, plateau of New Guinea.

Fig. 4. Native-built road and bridge near Mt. Hagen, New Guinea.

tropical crops could be expected. In view of the alluvial origin of most of these soils, it may be that they would stand up well to continued cultivation and prove an exception to the general rule that most tropical soils lose their fertility rapidly.

Drainage in most parts of the Markham valley is good and there are no extensive swamps. Pockets of land near the main streams and their larger tributaries may be inundated to shallow depth after heavy rains in the mountains, but most parts of the valley are not subject to damaging floods. Large tracts of open grassland and semi-open savanna country—probably the result of long-continued clearing and burning operations by generations of natives—cover much of the valley floor except in the easternmost and westernmost parts of the region. The few natives at present seem to make very little use of these grasslands other than as game reserves for staging occasional hunts, evidently finding that the remaining forest patches are more suitable for their economy, which is based largely upon shifting cultivation and dependent upon primitive hand tools, notably the 'dibble' or digging stick. Experience on army farms in 1944, however, showed that these grasslands could be prepared for cultivation swiftly and cheaply, the usual method being to burn off the tall, coarse, tropical grasses toward the end of a short dry spell, and follow this with two or three ploughings with a disc plough and tractor. Thus much land not at present available to the natives for rudimentary cultivation with hand tools could be brought under intensive cultivation with the use of modern agricultural machinery and advanced farming techniques. (The terrain throughout most of the valley is suitable for heavy agricultural machinery.) The total area of cultivable land in the Markham, Watut and Upper Ramu valleys appears to be in the neighbourhood of 1,000 square miles, or 640,000 acres, although some of this undoubtedly would be suitable only for shallow-rooted crops or for improved pastures for livestock farming.[14] On the assumption that each farm family might require up to 100 acres of arable land, there would appear to be room for some 6,400 farms in the area, or about 30,000 farm inhabitants, and perhaps several times this number if we include those who could make their livelihood from commercial, financial, professional, service, administrative and other occupations, as an outgrowth of agricultural development.

---

[14] Marr, *op. cit.* (While Marr gives a somewhat smaller area of cultivable land, he does not include a substantial tract of land in the Upper Ramu valley that seems to be just as suitable as much of that in the Markham valley and increases the cultivable area by some 300 square miles.)

CLIMATE

The climate of the Markham valley may be described as warm, rather humid, and equable, although such generalisations do not reveal the small but important local variations. Lae has a wet climate (average annual rainfall about 190 inches) and may be considered distinctly enervating. Farther up the Markham valley toward Kaiapit and Gusap the average annual rainfall decreases to about 70 inches and both the humidity and the night temperatures are markedly lower than at Lae. Night temperatures at Lae are usually in the low 70's in all months of the year, while mean monthly noonday temperatures range from 82 degrees in July and August to 89 degrees in February.[15] At Nadzab the early afternoon temperatures in January ordinarily rise to a peak of 90-92 degrees, but in July seldom over 83 degrees, while the mean minimum temperatures in those months are about 76 and 72 degrees respectively. The relative humidity at Lae ordinarily ranges from a peak of about 92-97 percent in the early morning hours to a minimum of 61-76 percent about noonday, depending on the season of the year. At Nadzab, however, the relative humidity ranges from a maximum of 87-90 percent in the early morning hours to a minimum of 39-57 percent about noonday. Thus the somewhat higher daytime temperatures inland are at least partly compensated by the lower daytime humidity.

In terms of human comfort the climate of Nadzab and places farther up the Markham valley to the west is uncomfortably warm in the middle of the day (although frequently the heat is tempered by breezes) and rather pleasant during the night, especially in the early morning hours when sleep is most restful. Military personnel stationed in the valley during World War II found it desirable to sleep under a sheet, and sometimes a blanket, at night. They also found it possible to perform continuous work, physical and mental, on a regular schedule during the day with an hour or two of rest at noonday, without suffering heat exhaustion or even great discomfort. How long this could be kept up, of course, remains to be established. At any rate the evidence that we have at present suggests that the climate of the nland parts of the valley is not markedly different from that of Manila n the Philippine Islands or of the Gulf Coast and Lower Mississippi valley in the United States during the summer months of the year.

---

[15] U.S. Army Air Forces: *Report of the U.S. Army Air Forces Tropical Science Mission.* Dayton, Ohio, 1946, pp. 5-15.

Diurnal variations in temperature are considerable (20-30 degrees) and at least partly compensate for the lack of marked seasonal fluctuations. Additional relief from the monotonous warmth of the lowlands could be provided by frequent visits to the adjacent highlands, where at elevations of 5,000-6,000 feet the daytime temperatures seldom rise much above 70 degrees and the night temperatures ordinarily drop to the low 50's. At these altitudes fires are welcome for their warmth in the late afternoon and evening, several blankets come in handy during the chill night, and jackets are often desirable for wear during all but the hottest parts of the day. Rest camps and recreational areas could be provided for brief 'cooling off' periods without alienating any large tracts of land from native use. Whether or not this would provide an effective substitute for the climatic contrasts of middle latitudes remains to be seen. On several trips to the plateau valleys between Bena Bena and Mt. Hagen in 1944 personal experience showed that a day or two spent in the higher elevations allows one to return to the lowlands greatly revitalised.

It is suggested, therefore, that agricultural colonisation of the Markham valley by white people would not be feasible unless full advantage is taken of the nearby highlands for regular and frequent rest and recreation in a cool atmosphere (at least one or two weekends a month, if possible, with longer vacations perhaps once a year). Also it would be desirable and perhaps necessary to modify work schedules so that heavier farm tasks are performed during the cooler hours of the day and lighter work during the period from 10.00 a.m. to 3.00 p.m. It might also be desirable to work a shorter day, although this would not be compatible with the ordinary demands of farm life and might seriously interfere with the competitive position of the colony. Specialisation in types of crops or livestock that require less care, or in systems of farming in which most of the heavy labour can be done by machinery might, on the other hand, make it possible to shorten the workday. The matter of a noonday siesta requires further study, as there appear to be both advantages and disadvantages. The desire for rest at noonday in such a climate is strong, but if one actually sleeps during the noon hour it means the work day must start twice and some time is lost in the afternoon before maximum efficiency is regained. To accomplish the same amount of work as is normally done in mid-latitudes and still have an extra hour off in the middle of the day means that the work must be extended into the early morning hours (when sleep is most refreshing) or into the late afternoon (when recreation of some sort, or at least rest before dinner, is desirable). There is reason to doubt that a sleeping siesta is any advantage.

There are a number of other ways in which some of the climatic handicaps of the region might be wholly or partially overcome.[16] Proper siting and construction of houses to take full advantage of shade, air movements, and somewhat lower temperatures even a few hundred feet above the general level of the valley floor would be a help. So, too, would the installation of large-bladed, medium-velocity, overhead fans in parts of the house, such as the kitchen, which are most often used during the day. Screens for outside windows and doorways, and the use of insecticidal sprays, rather than individual mosquito nets in sleeping quarters, are a distinct advantage, the nets having a stifling effect if the mesh is small enough to provide real protection against the attacks of mosquitoes and other small insects. Dark glasses should be worn in the daytime to reduce glare and protect the eyes. Lightweight, porous clothing should be worn, as little as possible during the day, but enough at night to give reasonable protection against insect bites. The diet should be such as to generate as little body heat as possible and still meet nutritional requirements and satisfy tastes. Alcoholic beverages obviously should be avoided. Refrigerators would be desirable assets for preserving food in a fresh and uncontaminated condition, and it would aid appreciably if some type of low-cost, simply-constructed air conditioning apparatus could be devised for lowering room temperatures and reducing humidity. If air conditioning is attempted, however, it would be essential (in the interests of health) that the contrasts between outdoor and indoor climates be not too great.

TROPICAL DISEASES, HEALTH AND HYGIENE

White settlement in the Markham valley would not be practicable unless adequate steps were taken to prevent the spread of infectious or contagious diseases. Malaria control is likely to be the chief stumbling block, although there is reason to believe that the time is not too distant when that dread disease will cease to be the great scourge of the tropics, or at least will be susceptible to control in areas where economic advantages justify the costs. During World War II effective malaria control was achieved in the vicinity of base installations in New Guinea, the Solomon Islands and other parts of the Pacific, although this was not accomplished until late in the campaigns. Measures such as draining and spraying the breeding places of the anophelene mosquitoes, the wearing of protective clothing especially after dark, the use of repellants, sleeping under nets or behind screens, the use of aerosol 'bombs' containing DDT in tents and buildings, and regular dosage with atabrine or quinine all contributed to successful control, and in some areas where malaria had formerly been the greatest single cause of disability, the end of the war found it a lesser disease hazard. Whether or not it will be 'economic' to achieve effective control in the Markham valley is another matter, however, and one for future study prior to actual settlement of the region. It must be remembered that money was no object in that area during the war, for the outcome of the campaign in New Guinea largely depended upon efficient control.

---

[16] Douglas H. K. Lee: *Physiological Considerations in the Development of Tropical Centres.* Open Report No. 1, Fatigue Laboratory, National Health and Medical Research Council (Australia), 10 March, 1945, pp. 3-4. *Ibid*: 'Physiological Principles in Tropical Housing.' *University of Queensland Papers*, Vol. 1, No. 8, 1944, pp. 1-22. *Ibid*: 'Human Climatology and Tropical Settlement.' John Thomas Lecture, University of Queensland, 1946, pp. 30-31. (Unpublished manuscript.)

Another potentially serious disease is the form of typhus now generally known as 'scrub' or 'mite' typhus, an endemic and virulent disease the carrier of which is a mite that frequents the *kunai* grass and forest undergrowth. Mortality rates were high in the early days of the war in New Guinea as a result of this disease, and especially among front line units in direct contact with mite-infested undergrowth. For those who eventually recovered, the convalescent period was exceptionally long, up to 80 days or more, and several times as long as for malaria recovery. No effective preventative or suppressive has yet been discovered, the usual treatment in the hospitals being plenty of rest, good food and careful nursing. But clearing of undergrowth and elimination of the grasslands would lessen the chances for contact with the mites, and the wearing of clothing impregnated with dimethylphthallate or dibutylphthallate offers further protection if the body is well covered. (This unfortunately also reduces the circulation of air about the body, which is desirable in a warm, humid climate.) As with malaria, the costs of control cannot be estimated on the basis of information now available, but clearly it would be unwise to embark on settlement projects before some sort of effective control is established, at least in limited areas in the valley.

Diseases of probably lesser significance in this area, but which likewise will require careful study and the application of effective control measures, are typhoid and paratyphoid fevers, bacillary and amoebic dysentery, hookworm, tuberculosis, influenza, pneumonia, epidemic conjunctivitis, a variety of skin diseases, dengue fever, filariasis, meningitis and poliomyelitis. Yaws is prevalent among the natives, and on the plateau, leprosy, but neither of these diseases is ordinarily acquired by whites short of prolonged and close contacts with infected persons. Pests that are widespread in New Guinea are lice (head, body and pubic), flies, ticks, fleas, rats and leeches, some of which may be potential if not current carriers of disease. Poisonous snakes and spiders, while present in small numbers, are unlikely to cause much trouble if reasonable care is taken by individuals.[17]

In general the presence of these diseases in New Guinea should not constitute an insurmountable obstacle to successful white colonisation in the Markham valley, if effective control can be established over malaria and scrub typhus. Proper diet, suitable clothing, good housing, habits of bodily cleanliness, purification of drinking water, use of screens and insect sprays and repellants, avoidance of the foci of infection wherever possible, good hospital facilities and treatment, inoculations and vaccinations, and other known methods of combatting disease would probably go far toward rendering the area 'safe' for white settlement. From the standpoint of the present discussion, it would seem to be not so much a problem of whether it *can* be done but rather of whether it will be *worthwhile* to do it.

One further aspect of the disease problem requires brief mention. Tropical neurasthenias accounted for many casualties in New Guinea among military personnel during the recent war. Some of these were due to conditions of life that would not exist, in all probability, among a civilian population, such as combat fatigue, excessive regimentation, fear of ambush or bombing, rebellion at social distinctions in the military pattern of life, and the like. But others, such as boredom, lack of adaptability to new ways of life or new environments, poor leadership, improper diet, homesickness, assignment to unwanted duties, and insufficient entertainment of the sort requiring active participation are all pitfalls on the road to successful peacetime colonisation as well as victory in warfare. To what extent climate may be involved, either directly or indirectly, is still a moot question. Most medical men who served in New Guinea assigned to it a secondary or contributing role; hence 'tropical neurasthenias' should not be taken to mean nervous disorders that are the direct influence of tropical climates. At any rate, much obviously could have been done to render the lot of military personnel in New Guinea a happier one if wartime demands had not interfered, and any planning for settlement in the Markham valley should take careful account of the experiences and knowledge gained during the recent hostilities.

---

[17] T. F. Whayne, G. W. Anderson and H. M. Horack: *Global Epidemiology*. Vol. 1 (India and the Far East, The Pacific Area), Philadelphia, 1944.

Attributes of the Markham Valley and Vicinity

The characteristics so far enumerated are that large areas of good soils appear to exist on the floor of the Markham valley; that the terrain is suitable for machine agriculture; that the drainage is good; that forest clearing is not a problem of any magnitude because much of the land is covered with coarse grasses that can be removed cheaply and effectively by machinery; that the natives are making little or no use of most of this land because they do not now need to do so and because they are not equipped with the technological means for coping with grass growth; that the climate is by no means as bad as that of most other parts of New Guinea, and probably no worse than that of Manila or Cairns where white people have established themselves in considerable numbers; and that it has been demonstrated that a wide variety of both tropical and temperate crops can be grown.

In addition to the above, good docking facilities are now available at the port of Lae at the eastern terminus of the Markham valley, where three or more Liberty ships could be berthed simultaneously in 1944, where an entire fleet could lie at anchor in the spacious roadstead offshore, and where storage facilities were close at hand. A two-lane, all-weather, gravel highway leads from Lae to Nadzab at the eastern edge of the grasslands of the Markham valley, although recent reports indicate that sections of this road require repair. Six large airstrips are available at Nadzab and almost as many more at Gusap, if the need should arise for air transportation, although again some repair work would be required to put these back into operation. Additional airstrips were developed either just before the war or during hostilities at Kaiapit, Dumpu, Kainantu, Bena Bena, Garoka, Kerowagi, Chimbu, Mt. Hagen, Lae, Finschhafen and Wau, all in the area with which we are here concerned. The terrain in the Markham valley, it may be noted, is suitable not only for building airstrips (the chief reason for its occupation by the Allies in 1943-1944) but also for road construction, and if need be, railways. There is an abundance of constructional materials close at hand, such as gravel, sand, clay, building stone, and both hardwood and softwood timber. Limestone is also available for the manufacture of agricultural lime or cement. Adequate water supplies exist for both domestic and stock purposes, and perhaps in the long run, for hydroelectric power for the provision of light, refrigerated storage, electrified transport, and even specialised secondary manufactures. Not to be overlooked is the possibility that commercial ore deposits may be discovered in one part or another of this region, coal having been picked up in the stream bed of the Markham river and fabulous gold deposits having been found and developed in the Wau and Bulolo valleys less than 100 miles to the southeast. (A good highway already links these interior valleys where the placer deposits are being worked with the seacoast near the mouth of the Markham river.) Also the fact must not be overlooked that promising oil structures and seeps have been discovered in recent years in the Aitape region a few hundred miles to the northwest of the Markham valley, and that several large oil companies are test drilling in this region.

Limitations and Handicaps

These advantages, however, do not give cause for an exaggerated spirit of optimism with regard to white colonisation in this part of New Guinea. Plainly there is not enough land available to relieve the population pressure in any of the crowded countries of the world: Europe, India, China or elsewhere. The climatic handicaps are obvious. Control of virulent diseases is not likely to come overnight. Special precautions will have to be taken to prevent deterioration of materials subject to mildew, fungus growth, rust, corrosion, and the attack of termites and borers, chiefly by proper packaging, storage, shipment, chemical treatment of such substances as leather, certain kinds of cloth, certain types of wood used in construction, and food preservatives. Rates of fertilisation may have to be high in order to maintain productivity of the soils. Some segregation of the natives and whites may be necessary in the interests of health, safeguarding native life and customs, and preventing uncontrolled acquisition of land by white settlers.

Aside from the physical and social handicaps that would have to be overcome, there are political and economic obstacles in the path of the agricultural colonisation of this area. Understandably Australians, now in control of eastern New Guinea, are not anxious to open the gates to uncontrolled immigration, or to migrants who are not properly selected, carefully trained, and backed by sufficient capital to ensure that they will not be responsible for another ignominious failure on the island. Australians would not willingly take on the responsibility of governing a numerically superior white contingent with a widely divergent political ideology (there are, after all, only about 5000 whites now in New Guinea!) nor would they be enthusiastic about increased competition in established plantation enterprises, mining, trading, or other economic activities, as a result of which Australian commercial ventures might suffer. If agricultural colonisation of the Markham valley by white people proves feasible, Australians are likely to want guarantees to ensure the continued profitability of Australian enterprise in New Guinea, to make certain that migrants will be integrated into the Australian 'way of life' and not 'balkanise' the island, to ensure the economic stability of the new colonies and prevent colonists from becoming wards of the government, and to prevent the growth of alien cultures and ideals.

Detailed Information Needed

The only conclusion justified at the present time about the prospects for agricultural colonisation by white settlers in New Guinea is that the outlook is discouraging in most parts of that large but poorly situated island. There appear to be four scattered areas, however, that might be worth careful consideration, if it can be shown that there exist the need and the desire for such colonisation in an obviously difficult environment, that the necessary capital and other requisites for proper support will be made available, that the native interests need not suffer thereby, and that such colonisation is politically acceptable. Of these four areas, the Markham valley together with adjacent portions of the southern highlands and Huon peninsula appear to offer the most favourable combination of resources and, on the whole, the fewest disadvantages. At best this region is no tropical paradise, lacking only the magic touch of the plough, the tractor and the white man's fingers, but at least insofar as New Guinea is concerned it seems to warrant first consideration as a potential site for future land settlement.

It would be the height of folly, however, to proceed directly with land settlement in this area on the basis of our present limited knowledge of local conditions, no matter how urgent the need at present for finding homes for displaced persons from Europe or elsewhere, or for developing more fully the resources of New Guinea for economic or political advantage. Obviously we have as yet no suitable yardstick by which we can measure the region's advantages and disadvantages, and act accordingly. We can indicate, however, some possibly profitable lines of investigation, and suggest certain practical steps that might logically be taken to speed colonisation if detailed investigations show that it is feasible.

Preliminaries to Colonisation

It has already been indicated that the great and immediate need in New Guinea is for knowledge. Whatever prophecy may be made about the future of this island, it should be remembered that here, as in few other parts of the world, a shroud of ignorance still prevails, masking much of the true character of the island. Prehistorically and historically New Guinea remains a puzzle with most of the pieces still missing. At the present no living man is sufficiently well-informed that he can, with reasonable accuracy, draw the contours of New Guinea, differentiate its climatic types, produce a map of its mineral or plant resources, show in detail the relative productivity of its soils, or in general provide the basis for a better ordering of New Guinea's future. Planned settlement must wait upon such information.

The investigation and experimental phases of this problem may be approached in some such manner as this, with due regard for logical sequence: (1) Determination of the real need for colonising land with such obvious limitations as that in New Guinea, and the willingness of persons with the necessary qualifications to migrate there and remain there. (2) Investigation of the political attitudes in Australia and New Guinea toward colonisation, to determine whether or not it would be permitted if it were shown to be feasible, what restrictions on geographical location, economic activities, movements and numbers might be imposed, and what economic, political and social guarantees might be required. (3) A detailed, comprehensive survey of the resources of the Markham valley and contiguous areas, to furnish the latest and fullest information on local relief, soils, drainage, climates, flora, mineral resources, availability of specific constructional materials, transport problems, distribution and needs of the native population, crop possibilities, hydroelectric potential, domestic water supply and disease problems. The survey party should be led by an Australian official of the government in New Guinea who already has some knowledge of the area, such as Col. James Lindsay Taylor, who has explored parts of it on government patrol and who is well-informed on native problems and on good terms with the natives. It should include, if possible, a civil engineer, agricultural economist, soil scientist, medical officer, geologist, anthropologist, and plant ecologist, all with previous experience in this or other similar tropical environments. It should be fully equipped, mobile (provisioned from the air if necessary) and prepared to remain at least a year in the region if that proves desirable or necessary.

(4) If these preliminary investigations show that colonisation is practicable two or more well-staffed and well-equipped agricultural experimental stations should then be established in widely separated parts of the region (in addition to that which has been established for some years at Kainantu) to undertake a wide range of field and laboratory experiments, not the least of which would be to find out how the soils stand up to continued cultivation, and what the fertiliser requirements are likely to be. (5) If these field trials demonstrate that the land is sufficiently productive, it would probably be desirable to concentrate next on the segregation of the native population, the survey and marking of farm blocks, the construction of access roads and a road to the adjacent highlands where recreational facilities are to be established, the provision for domestic water supply, and the installation of light and power, and provision for housing, storage, and community meeting places, as well as minimum requirements in the way of recreational, educational, and medical facilities. (6) Then and then only, should colonists actually be brought into the valley, except perhaps for an advance echelon assisting in the work outlined above. If less were done in advance, the effect would be demoralising if not disastrous, as experience with group settlement schemes elsewhere in the world has shown.[18] This is clearly not an area where complete reliance on individual initiative or 'operating on a shoestring' in 18th century American pioneer fashion is likely to succeed. The first communities should be small and manageable and they should serve primarily as pilot or trial colonies to which others later might be brigaded if the trial colonies warrant. This would contribute toward orderly occupation of the land and tend to eliminate costly errors in judgement, method or execution. (7) Later steps, it may be assumed, would be the filling in of blocks of suitable land previously unoccupied, the elaboration of

---

[18] Robert G. Bowman: 'Prospects for Settlement in Western Australia.' *Geogr. Rev.*, Vol. 32, No. 4, October 1942, pp. 598-621.

community activities of all kinds, improved communications with other parts of New Guinea and with the outside world, diversification of the local economy—to include perhaps mining, fishing, lumbering and some secondary industries adaptable to local conditions as well as additional agricultural diversification—and the provision so far as possible of a varied and interesting cultural life as distinct from purely economic activities.

The Concern of Australia and New Zealand

Sentiment on the subject of what should be done with New Guinea varies widely in Australia today, just as it has in the past. Some support the *status quo*, some think the island ought to be given back to the Melanesians, Papuans and Negritos, some rather gloomily predict that it will be overrun by southeast Asiatics eventually and there is little point in trying to prevent it, some favour the immigration of displaced persons from Europe to New Guinea, and some with patriotic fervour maintain that more Australians ought to go there as colonists. Most Australians, in all probability, do not care much one way or another, except in that they might be concerned over its future domination by a strong foreign power. That in itself is not sufficient incentive for large-scale colonisation by Australians.

Officially Australia is committed to a policy of improving the lot of the native in New Guinea, although for various reasons little has been accomplished to date. But if more is done to improve health standards, to diversify the diet, to extend law and order and to build up the native standards of living, it may well be that in time the removal of important natural checks to population growth will present Australia with the same kind of problem that exists in crowded Java and Puerto Rico, where pressure on the land is intense and the fruit of colonial enterprise is privation and political instability. One also may wonder whether restriction of the number of whites on the island to the present low figure, or something approximating it, is in the best interest of the natives, in view of the oft-voiced belief of most anthropologists that culture progress depends largely on culture contacts and that isolation favours stagnation. The backwardness of Melanesia, as contrasted with Polynesia and Indonesia, has in part been attributed to relative isolation from contacts with the outside world. If this is true, Australia (having the interests of the native at heart) should encourage ulture contacts. One way of doing this would be through encouraging immigration to the island and placing as few restrictions as possible on the activities and movements of newcomers, commensurate with the obvious need for some measure of control to prevent exploitation of the natives.

To the vast majority of Americans who know anything at all about this part of the Pacific basin, Melanesia is a strange and distant world, and what goes on there is of slight significance in contrast with trends in the Orient and Europe. But to Australians and New Zealanders, with their growing interest in Pacific relations, it should be a region of immediate and vital concern, a sort of threshhold over which nearly ten million white people have reason to eye Asia and its teeming coloured populations with mounting interest, hope, and perhaps not a little trepidation. Is Melanesia to become the future meeting ground and melting pot for white and coloured races in the southwest Pacific? Are the contacts to be peaceful and mutually advantageous or violent and destructive? Should the whites move forward into this frontier zone, or encourage immigration of whites from other countries to counterbalance growth of the native population and possible immigration of Asiatics to the western parts of the island, or merely attempt to maintain the *status quo* as long as possible? Southeast Asia is stirring in more ways and places than one, and it will be interesting as well as fateful to see what approach, dynamic or static, will mark future white activities and policies in this region.

NEW ZEALAND FARMS AND THE 'PHOSPHATE ISLANDS'

SIR ALBERT ELLIS

SINCE THE EARLY days of World War II and up to the present time it is doubtful if there has ever been such an urgent call for increased production from New Zealand farmlands; and there is every appearance of this state of affairs continuing. The dominion now stands in the front rank of food producing countries. This is particularly true of its capacity to export, and in no small measure the United Kingdom looks to New Zealand during these years of serious food shortage. What are our prospects for meeting these demands? How will our farmlands stand up to the heavy strain and still retain their high degree of fertility?

These questions might be answered briefly by the statement that the humus content of our soils must be built up, and there must be a progressive increase in the application of phosphatic fertilisers.

Humus and Farmland

We hear a good deal nowadays about the necessity for conservation of organic residues and particularly about the scientific treatment of sewage and returning its useful manurial constituents to the soil. Such a practice would undoubtedly develop the humus, and sooner or later, in common with European practice more attention must be paid to it. The utilisation of sewage in eastern countries is done crudely but thoroughly, and a scientist who recently visited New Zealand gave much credit to the Japanese in this respect, attributing their health and vitality largely to their methods of manuring, but he made no mention of the fact that the prewar import of phosphate rock into Japan amounted approximately to a million tons per annum, about three times as much as New Zealand was using. The Japanese themselves attribute great value to the use of superphosphate and are now eagerly seeking supplies.

It is assumed that any future treatment of sewage in New Zealand will be by modern methods, and if this can be done without causing conditions adversely affecting the health of the community it should be a very valuable development. One cannot but wish such efforts every possible success, although it appears that there is not much room for optimism since labour conditions here are very different from those in eastern countries. The high cost of transport and distribution of sewage from the point of chemical and mechanical treatment to the stage where it is spread on the land will be a serious hurdle. It is noticeable that the farmers themselves are not enthusiastic on the subject.

Much has been said in favour of the practice of building up the humus content of our soils by means of compost heaps as a system of using up any organic residues. Great numbers of our domestic vegetable gardens are developed in this way with very excellent results, and they constitute a useful hobby for the householder. The growth of foodstuffs under these conditions is a very interesting form of agriculture and is as old as history; long may it continue, provided the necessary sanitary precautions are taken. But to argue that farming operations can and should be carried out by a similar system of composting is to lose all sense of proportion; the cost of labour here is much too high for such methods on even so small an area as a hundred acre dairy farm.

BUILDING UP HUMUS

How then can the humus content of our farms be built up to best advantage? One of our leading grassland authorities, on being questioned on this matter, replied, 'New Zealand is a compost heap!' By this he meant that the existing practice of regular topdressing with phosphatic fertilisers, plus the normal decay of grass and roots, and particularly the distribution of stock droppings by systematic harrowing, develop humus naturally and almost automatically as compared with the laborious methods already referred to. Put on the phosphate, keep the farm well stocked and we can be sure that under our present system of agriculture the humus content of our soils will increase indefinitely.

As an instance of what has happened with great numbers of farms we may turn to the pumice area where only a few years ago many thousands of acres were considered useless for farming, the soil being singularly deficient in humus and stock liable to 'bush sickness'. The same area now contains hundreds of prosperous dairy farms, and there is still ample scope for further development. Briefly, the transformation process is to clear and plough the land and then give it a heavy dressing of superphosphate, about nine cwt. per acre. This speedily develops a remarkable growth of clover, which in its turn stimulates useful grasses. The land is then ready for the dairy herds, and its occupation combined with annual topdressing result in a comparatively rapid development of humus. 'Bush sickness' is kept under by including a proportion of cobalt with the superphosphate. It is doubtful if the dominion's pastures ever looked as well as they did last season, admittedly a good one. There is still much room for improvement, particularly on hill country with its second and third class lands, but the future can be regarded with confidence.

'Artificial' Fertilisers

Sometimes one hears the assertion that so and so (not a farmer by any chance) says he does not believe in these 'artificial' fertilisers, and that too much is coming into this country. In reply it may be said that there is nothing 'artificial' about phosphate. Its base, phosphorus, is an element readily combining with lime and is a vital constituent of all organisms. The human skeleton alone is composed mostly of tricalcic phosphate. Our daily bread and, in fact, everything we eat must contain its quota of phosphatic constituents, otherwise we are soon faced with a deterioration of health. The only 'artificial' feature about these fertilisers is the common practice of treating raw phosphate with sulphuric acid thus forming superphosphate which is soluble in water and therefore quickly available for absorption by the roots of plants. Immediate results follow in plant growth so that the process of manufacture has the effect of assisting nature.

It is an incontestable fact that our soils to be fertile must contain the necessary quota of tricalcic phosphate whereby plant life is sustained. In this respect it is unfortunate that the soils of New Zealand, like those of Australia, are naturally deficient in phosphate content. To use an agricultural expression, it is the 'limiting factor'. The position therefore is that our soils, with their deficiency of this vital constituent, have to yield an ever increasing quantity of food and other farm produce. The more we can produce, the better for ourselves and the greater our measure of assistance to the mother country. Every shipment sent from these shores takes away its quota of phosphate, in aggregate many thousands of tons per annum. Unless this is replenished from outside sources the soil will speedily become impoverished, production will fall to a minimum and the land revert to a condition of noxious weeds and 'second growth'. Not only the farmers but the entire community would suffer.

SOURCES OF PHOSPHATE

To make good this loss the phosphate industry has come into being, and has increased with remarkable rapidity in comparatively recent years. Some countries, particularly the United States, France and Russia have enormous deposits of phosphate within their own territories, and sufficient reserves for many hundreds of years. New Zealand and Australia unfortunately are without such deposits. Close search has been made for them, particularly during the recent war period, but only low grade material has been found. This was utilised, solely as a war measure, to help out the reduced supplies of higher grade. It became obvious that the two countries must continue to look overseas for their phosphate requirements.

Before the outbreak of war, New Zealand and Australia were obtaining their supplies of phosphate almost entirely from Nauru and Ocean Island, two central Pacific islands where huge deposits of high grade phosphate exist. In 1920 the industry of mining, treatment and shipping this material had been acquired by the United Kingdom, Australia and New Zealand who, acting in close collaboration, bought out the interests of the London company which had been working the deposits since 1900. This was accomplished with much enterprise, and with great benefit to the two latter countries. At the time it was arranged by the three governments that the industry should be carried on by a commission consisting of a representative of each country, and that it should be run strictly on business lines. In this way the British Phosphate Commission was set up, and during its control much further progress at the islands has been made. By 1939 the rate of export to Australia and New Zealand had reached 1,250,000 tons per annum.

A factor which largely determines the utility of phosphate supplies to various countries is the proximity of the deposits to their shores, for this governs the question of ocean freight which is the main expense to be met. It follows therefore that the United Kingdom's and Europe's requirements are mostly supplied from the enormous deposits in North Africa, principally Morocco, Algeria and Tunisia which are owned and controlled by France. Russia and the United States are well placed with their huge deposits, and there is always the possibility of more being discovered and opened up in close proximity to other countries. For New Zealand and Australia the nearest sources are the Nauru and Ocean Island deposits which have the further advantage of being

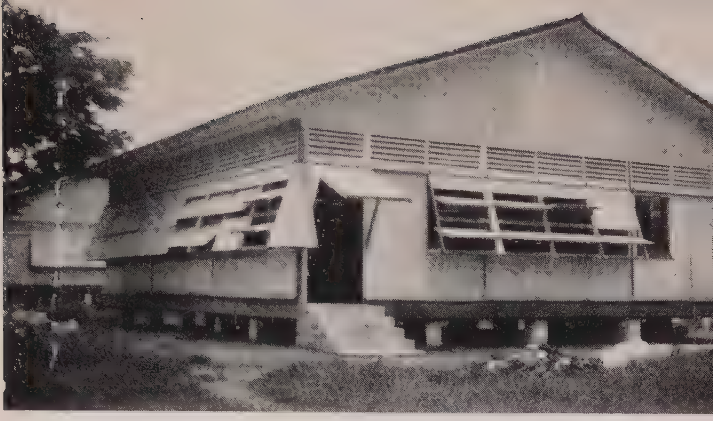
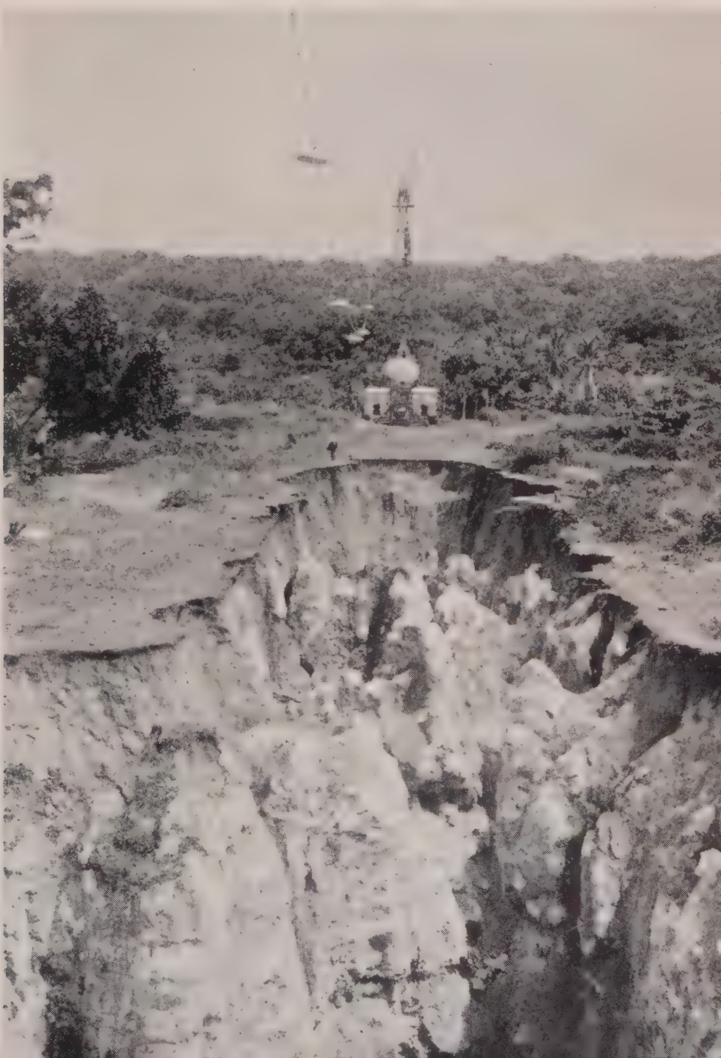


Fig. 1. Nauru Reconstruction Work. Prefabricated staff houses (married quarters) are cool and comfortable.

Fig. 2. Phosphate Workings, Nauru (prewar). Loaded skips are hoisted by cableway and discharged into the hopper (near tower), where trucks are loaded. Pinnacle rocks in foreground and centre are coral limestone. Elsewhere the deposit seen is phosphate, including the area in the background.



very high grade. Very useful supplies of somewhat similar phosphate are also obtained from Makatea, a French island in the eastern Pacific near Tahiti, and from Christmas Island near Java, which is comparatively close to Western Australia, a state that is a large user of phosphate, principally for its huge wheat areas.

The Phosphate Industry in the War

During World War II phosphate supply became a very critical matter. Towards the end of 1940 two German raiders, operating near Nauru, sank five large vessels engaged in the trade, three of them being owned by the British Phosphate Commission. Shortly after this disaster one of the raiders bombarded Nauru for two hours, obviously with the intention of destroying the shipping facilities and holding up supplies of phosphate for Australia and New Zealand. Great devastation was caused, but the huge loading cantilever remained standing though badly damaged. As soon as possible, repairs to the structure were put in hand, and meanwhile loading was carried on by improvised methods which of necessity entailed delay with shipments. Ocean Island was not attacked by the raider, as the commander had the idea that it was fortified. To guard against further raider attacks, it was necessary for auxiliary warships to stand by while the phosphate vessels were loaded; still more delay resulted from the necessity of having to make up convoys.

In view of the setback at these islands, arrangements were made by the New Zealand and Australian Governments for the British Phosphate Commissioners to bring supplies of phosphate from any other sources that might be available. As a result extensive purchases were made from Makatea, the Red Sea area and Florida, and valuable aid was given by the British Ministry of Shipping in allocating tonnage to lift these supplies at a most difficult time. In arranging all this business, the commission worked in close touch with the Departments of Agriculture both at Wellington and Canberra.

As the war progressed, the position further deteriorated at the islands, and with the entry into the conflict of the Japanese it was realised that the situation there was hopeless. Their bombers were over both islands the day after Pearl Harbour and on several subsequent occasions, doing a great deal of damage. It became obvious that evacuation of the Europeans and of the Chinese labourers was necessary, but with the Allies so heavily engaged elsewhere, it was most difficult to arrange an evacuation expedition. Eventually this was done, and to the immense relief of all who realised the peril of the situation, 226 Europeans and 597 Chinese were taken to Australia without the loss of a single life. A small French cruiser and the commission's motor ship *Trienza* carried out this fine service. Unfortunately it was impossible to remove the native inhabitants. Before leaving Nauru and Ocean Island an elaborate plan of demolition was carried out so that the Japanese would not be able to ship phosphate to any great extent.

In August 1942 the enemy occupied Nauru and Ocean Island and held them for more than three years, during which time very little was known about events there beyond what could be seen by reconnaissance aircraft. This revealed that the Japanese were there in great force and had strongly fortified both islands. A landing assault on Nauru was contemplated by the Americans at one stage of the war, but fortunately it did not eventuate, for the limestone formation of the island with its numerous caves, cliffs and masses of coral pinnacles favoured the defence entirely. Great loss of life would have been inevitable. However, systematic bombing was carried out by the Americans; the Japanese airstrip was put out of action, their planes destroyed, and their lines of communication cut, so that food and other supplies could not reach them; their position was hopeless. On one occasion a strong American naval squadron bombarded the island in the early dawn, causing great damage. With all this attacking going on day after day it became obvious that very little of the phosphate equipment would be left standing.

War's Destruction

Shortly after the collapse of Japan, arrangements were made for an Australian warship with two transports and a considerable force of troops to set out from Torokina in the northern Solomons to accept the surrender of the Japanese at Nauru and Ocean Islands. A party of three New Zealanders, including the writer, joined the expedition at Torokina to represent the dominion at the surrender ceremony, and five of the commission's island managers and engineers went at the same time to examine and report on the conditions at both islands, and to make preliminary arrangements for the resumption of phosphate operations. The expedition arrived at Nauru on 13 September 1945, and the Japanese commander signed his surrender on the quarter deck of *H.M.A.S. Diamantina* that afternoon. The Union Jack was formally hoisted the following day.

A dreadful story of brutality and systematic terrorism by the Japanese during their occupation was revealed. Seven Europeans had voluntarily remained on the island at the time of the evacuation to look after the natives and some Chinese. All of this heroic party except two Catholic Mission Fathers, were murdered by the Japanese immediately following the first attack on the island by the American bombers. About twelve hundred of the Nauruan natives were deported to Truk and Kusaie, the former being a thousand miles distant. Those remaining on Nauru, together with the Chinese, were brutally treated, a number of them being killed for trivial offences, while all were forced to work hard and build defences and airstrip.

Examination of the conditions ashore confirmed that the government's and the commission's settlements were completely destroyed, as also were most of the native villages, their churches and mission stations. The officers of the expedition appropriately called the place a shambles. The cantilever was still standing though further damaged, while in the centre of it the Japanese had constructed a small fort with reinforced concrete pillboxes and machine guns. Round the coast there was an elaborate system of fortifications, six-inch naval guns, machine-gun posts, tank traps and trenches, while out on the surrounding coral reef there were rows of tram rails set into the rock as barriers against attack by landing craft. Obviously the Japanese intended to hold the island with its valuable phosphate deposits permanently.

One of the most impressive features was the dreadfully insanitary conditions everywhere. With their food supplies cut off by the bombing attacks, the whole population of about 5,000 had to live on the meagre local produce: this was done in a resourceful although most insanitary manner. Hundreds of large petrol drums cut in half were set into the ground in all directions, and in these excreta and refuse were deposited, and afterwards distributed for the purpose of growing immense quantities of pumpkins. Practically all the coconut palms were tapped for toddy, the sweet and wholesome sap of the tree; and on a diet of pumpkins, toddy and what fish they could catch, the entire population existed. The system of cultivation in the blazing tropical heat, however, was odorous to a degree, there were inconceivable swarms of flies, and as was to be expected, dysentery and other diseases were rife. Evidently there had been a considerable rate of mortality. A

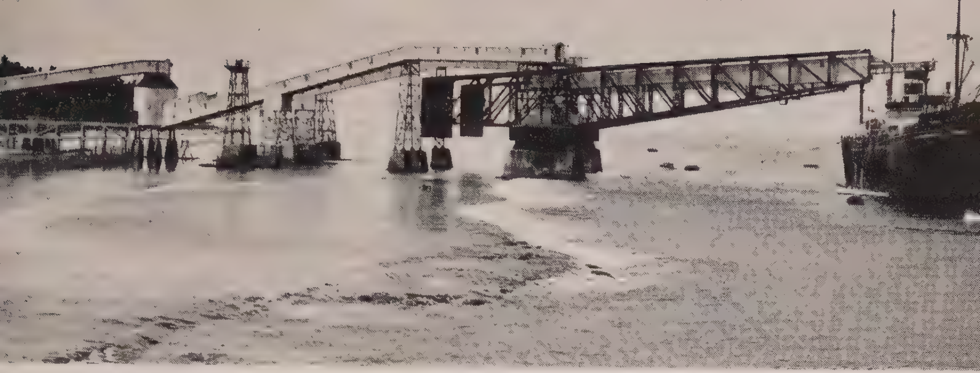


Fig. 3. Loading Phosphate by Cantilever, Nauru (prewar). Photo taken at low tide. The last pair of piers is at the edge of the coral reef from which the sea bottom descends at an angle of 45°.

garrison of Australian troops was established and hygienic measures were at once put in hand with good effect. Full supplies of stores, medical equipment and other necessaries were landed; the Japanese forces of about 2,500 were then taken aboard the transports and transferred to concentration areas near Torokina.

The expedition then went to Ocean Island where the Japanese surrendered on 1 October 1945, and the Union Jack was hoisted that afternoon. A somewhat similar story of cruelty and terrorism was revealed there, and not a single European or native remained on the island, or so it appeared on our arrival. Five Europeans had voluntarily remained behind at the time of the evacuation to look after the 2,000 natives, but they were all dead. The natives were deported by the Japanese to Nauru and to Kusaie in the Caroline group except for about 160 who were massacred in one act *after* the news of Japan's collapse had reached the commander at Ocean Island. In a marvellous manner one of the Gilbertese natives, Kabunare by name, escaped from the massacre and hid in a cave for three months, coming out some time after the Japanese had been taken away. He gave full particulars of what had happened. This and other evidence went hard against the Japanese when a number of them were tried for war crimes subsequently at Rabaul. The Australian military court dealt with a heavy hand and the culprits were appropriately punished.

On examination we found that conditions at Ocean Island were much better than at Nauru though a great deal of damage had been done to the settlements and the phosphate equipment, not only by the Japanese but also by the commission prior to the evacuation, so that the enemy could not make use of the plant. It was ascertained on both islands that the Japanese had made arrangements to do this, and had installed some temporary gear, but by the time they were ready to commence shipping, the islands were cut off by bombing. It is doubtful whether a ton of phosphate was shipped.

This in brief is the story of Nauru and Ocean Island during their three years of enemy occupation. It is told more fully elsewhere.[1] In view of the small size of the islands, probably more damage was done and more hardship experienced proportionately than on any other islands in the Pacific. Were there no redeeming features? There were, and they are to be remembered with all due respect. We should reflect on the courage and devotion of the Europeans who voluntarily remained on the islands at the time of evacuation to care for the natives; they made the supreme sacrifice under conditions of great suffering. Then comes the manifest loyalty of the natives even though it was evident that their treatment was made worse by that very loyalty. And lastly, the pluck and resource displayed by the commission's staff and labourers on the reoccupation of the islands, in repairing the damage and bringing them back into production, deserves the highest praise. Conditions there were extremely trying, particularly in the early days of the reoccupation, but a good job of work has been and is being done.

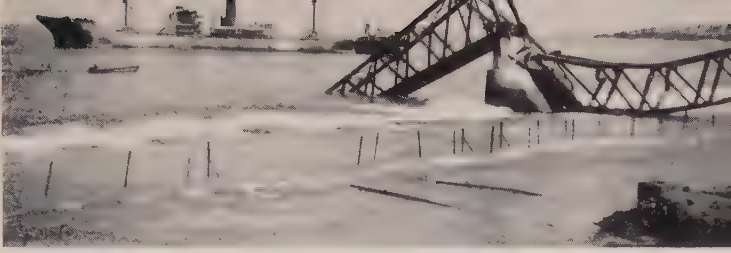
RESTORATION

In close cooperation with government officials at both islands, one of the first measures undertaken was to collect the three thousand or more natives who had been deported by the Japanese and to take them to their homes. Several hundred of the Nauruans had died or were killed at Truk, and both there and at Kusaie the natives existed under conditions of semistarvation and more or less slavery. The commission's two vessels, *Trienza* and *Triona* were used for this work; it was done expeditiously, and with a tremendous degree of happiness for the natives.

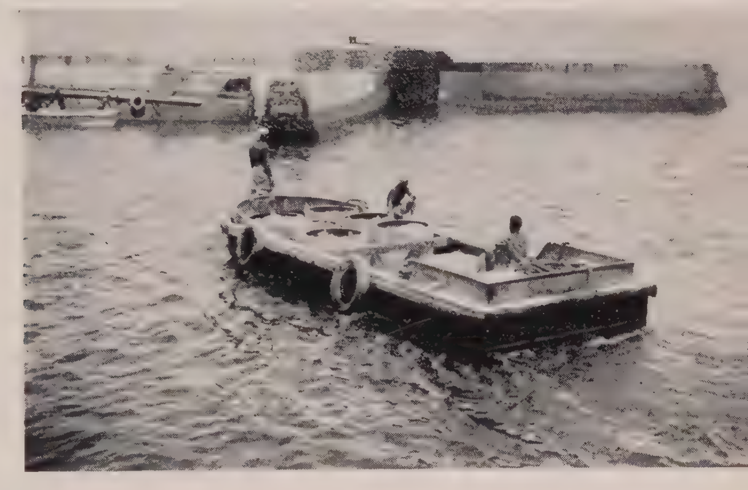
Preparations for reconstruction at both Nauru and Ocean Island had been put in hand by the commission as soon as the war took a favourable turn, and enormous quantities of building material, including prefabricated houses and workshops, steelwork for constructing temporary shipping facilities, boats, lighters and provisions were stored at Melbourne ready for shipment at the earliest possible moment. Naturally the human element was the most important, and with this in view some of the commission's experienced island staff had been retained during the war. Others had joined up on war service, but as soon as the word was given by the general manager they assembled in readiness for starting off, and within a few days after our return home

---

[1] Sir Albert Ellis: *Mid-Pacific Outposts*, Auckland, 1946. (See review in *New Zealand Geographer*, Vol. 3, No. 2, Oct. 1947, p. 209.)

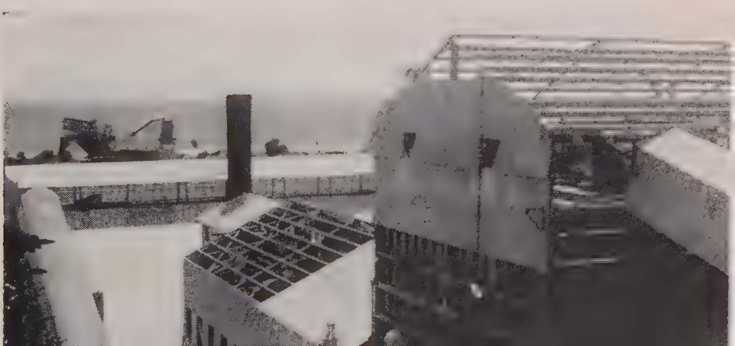


4. Resumption of Phos-
te Shipping at Ocean
d. S.S. *Triona* with first
war shipment. The steel
was destroyed prior to
uation to prevent its use
apanese. The line of rails
g reef in foreground was
ted by the enemy to
ruct landing barges.



5. Postwar Shipping of
sphate at Ocean Island.
tering by power barge of
type, conveying about
ns of phosphate contained
tubs ready for hoisting
hip's winches.

. Repairing War Damage
auru. Steel framework of
efabricated building for
ne stores, boatshed, etc.



7. Repairs to Main Phos-
e Unit at Nauru. In fore-
nd conveyor and crusher
ing, then artificial driers,
onveyor to storage bin of
o tons capacity. In dis-
cantilever under repair

by air, the *Trienza* left from Melbourne with a large staff of Europeans for each island, most of them old hands. The vessel was loaded with equipment and provisions for the work of reconstruction, and fortunately fine weather was experienced for discharging all this material at the islands, just when smooth sea conditions were most needed.

One of the most cheering features of the operation was the way the native labour from the neighbouring groups flocked back to the commission's service, thus saving the situation for us. They had suffered so severely at both islands that it would not have been surprising had they declined to re-engage. But they said their employer would be 'all the same before'. That was good enough for them, and they came by hundreds. There is now a sufficient force, even though the labour position elsewhere in the Pacific is difficult. A number of skilled Chinese and coolies was required, and on communicating with Hong Kong where they were obtained previously, we received official advice that none was available. However, one of the commission's senior staff went there by air and found the prospects were fairly good, since quite a number of old hands were desirous of returning. The *Trienza* was sent at short notice and brought back as many as were required.

The work of reconstruction at both islands has gone very well, though there have been many difficulties to overcome. Material for renewals was short and many orders for machinery could be fulfilled only after long delay. It was necessary to salvage as much as possible of the steelwork from the Japanese fortifications and underground defences. Great quantities of the commission's tram rails, cableway tower material and trucks were recovered by this means, but the enemy had for some reason made a practice of cutting everything in halves or quarters, and these had to be electrically welded. One way and another a great deal of resource was displayed by the engineers on the two islands.

The artificial drying plant on Nauru had been badly damaged though fortunately the huge cylinders were intact; the reverse might well have been the case as an unexploded 500 lb. shell was found near by. It was necessary to ship the phosphate in a wet state until the drying plant was repaired. Loading was done by lightering, using powered barges of navy type instead of surf boats as previously, and on the whole they are proving fairly suitable. New sets of deep sea moorings had to be laid; in many ways it was like beginning operations over again at Nauru. Fortunately the boat harbours at both islands had not been destroyed.

Meanwhile the major task of repairing the cantilever has gone steadily ahead. In April 1948 one of the arms should be ready for use, and the other two or three months later. Since it has a capacity for handling over 8,000 tons a day, the next problem will be to keep it supplied with dry phosphate. All the railway lines had been destroyed by the enemy. However, roads were constructed from the phosphate fields to the storage bins, and motor lorries have taken the place of trucks, but the railways must be reconstructed.

Output Resumed

After about seven months of preparatory work, phosphate shipping was resumed at both islands and nearly 270,000 tons were sent away during the ensuing twelve months. For 1947 the figures should be nearly doubled, and before 1950 Nauru should be back to its prewar capacity, giving an output of 1,250,000 tons from the two islands.

Imports into New Zealand during the later stages of the war, and up to the present time, rapidly improved. As soon as possible after the North African ports were open for commerce, purchases of Moroccan and Algerian phosphate were made and sufficient tonnage was secured, although freight charges remained at the high level. Rationing of the supplies was necessary to some extent, but the shortage was not very serious. With the increased quantities now coming in from Nauru and Ocean Island it is evident that we have at last caught up with the demand. The dominion's requirements, including a relatively small quantity of very useful but costly basic slag and finely ground phosphate, now amount to about 400,000 tons per annum, a huge quantity, and one that strains the dominion's facilities for discharging, transporting by road and rail, and the present capacity of the fertiliser works for manufacturing it into superphosphate. In the near future the supplies brought in by the British Phosphate Commission will be entirely from Nauru and Ocean Island, Makatea and Christmas Island. These are the nearest sources and have the added advantage of being a similar class of phosphate, and the best obtainable.

The question of the selling price of superphosphate is causing some concern at present since the government subsidy has been lifted. Although the increase in cost that results is met by improved prices for farm produce, there is anxiety on the part of the farmers as to the prospects for the future. Not much can be said beyond the fact that the price of phosphate is on the down grade. It will be realised that the higher cost of plant, stores and provisions, in fact everything that is required at the islands, together with the universally higher rates of salaries and wages, has put up the cost of production, although it is considerably lower per unit of phosphate than is the case with supplies purchased elsewhere. Increased shipments from Nauru and Ocean Island must favourably affect the position. The main expense is the high rate of ocean freight, a world wide condition. We can only hope that this will come down as tonnage lost during the war is replaced.

FUTURE NEEDS AND SUPPLIES

Will the demand for phosphate continue to increase in New Zealand? There is reason to think that this must be so. Butter, cheese, frozen meat and wool can be produced here under better conditions of climate than in other countries, so it is said; and the demand for these commodities continues to expand. This dominion is capable of much closer settlement than exists at present, and more intensive methods of cultivation will develop. Our first class lands are possibly developed almost to their full capacity; that remains to be seen. With the second and third class country there is still much room for improving existing farms and for developing new areas. It may well be said that the future of New Zealand depends on these farms in the back blocks, the hill country, the clay lands of the north, the vast pumice plateau of the interior; great stretches of land of this kind are still in fern and manuka, awaiting 'breaking in'. The farmer engaged in this strenuous work deserves all the help and encouragement that can be given him, for he has 'a hard row to hoe'.

Memory takes the writer back to an occasion before the days of topdressing when, as a lad with one or two others, he rode for the first time through some wild rough country in the Hinuera district, between Cambridge and Matamata. A small farmhouse, apparently abandoned, was seen several hundred yards back from the road, with a track leading to it. With curiosity aroused, he passed along this and came to a notice roughly painted on a piece of board nailed to a manuka stake: 'The Road to Ruin'. Someone had tried hard to make a living there; he had done a lot of work, but had failed; it was rather a tragic sight. Nowadays plenty of the same type of country is still available. If the farmer who tackles it can afford to put on the indispensable phosphate, he may well be on the road to success. He will also be assisting the prosperity of the dominion; and he will have the privilege of aiding in the very urgent task of supplying more 'Food for Britain'.

SERVICES VEGETABLE PRODUCTION: MARKET GARDENING IN WARTIME

IAN BLAIR

FOOD ASSUMED new proportions as a munition of war during the period from 1939 to 1945, and the concentration of military forces in the dominion and nearby islands created a formidable local demand for vegetable crops. In 1942 home-based military forces reached a peak of almost 108,000 mobilised men and women, while in 1943 these were heavily reinforced by the arrival of United States Marine Divisions. By that time local requirements by the services of fresh vegetables, excluding potatoes, were calculated to amount to approximately thirty tons daily. It had become obvious that the established market-garden industry, comprising then some 9,500 acres, could not adequately provide the needs of both the civilian population and the military establishments, and consequently, the Department of Agriculture was instructed to establish and develop Services Vegetable Production. The scheme came under the direction of P. W. Smallfield, now Director of Rural Development, and one of the department's most versatile officers. Thus during 1943-1945 a state department undertook to organise the production and distribution of the full vegetable requirements of forces located within the country, and to assist overseas supply. The RNZAF drew upon the supply only partially since small areas of vegetable production had previously been established on certain air stations.

The scheme aroused interest and condemnation; it was also scorned and obstructed. The programme commenced in the untilled soil of grass paddocks, but when fortified with equipment in the hands of an enthusiastic body of men and women, the scheme became an enterprise that deserves acknowledgement in New Zealand's recorded war history. It was also a story full of human interest. Some features of that story are presented in this illustrated account.

THE ORGANISATION OF SVP

The scheme was eventually organised into two main groups. Firstly came the headquarters group comprising the Superintendent

SVP, the Assistant Superintendent SVP, the Accountant, Technical Advisers, the Supervisor (Overseas Supply), Military Directors of Supply and Transport, and American Liaison Officers. Secondly, responsible to the headquarters group, came the District Supervisors in Auckland, Palmerston North, Nelson, Christchurch and Dunedin. The relative importance of these districts can be judged from Table I.

Individual projects comprised a local supervising officer, an overseer, a storeman-timekeeper, gangers, tractor and truck drivers, cooks, a matron and field workers.

TABLE I

NUMBER AND SIZE OF PROJECTS

	Auckland	Manawatu	Marlborough	Canterbury	Otago
Projects	13	9	1	2	2
Acres	2374	1436	73	173	106

The effort called for vegetable production under field crop conditions rather than those of market gardens. Cabbage and carrots in fifty to sixty-acre blocks rather than handkerchief plots were required. It was clear that key men were wanted who were endowed with wide experience in arable crop methods, and on this account personnel of the Fields Division of the department found themselves charged with heavy responsibilities. Specialist Horticulture Division men did, of course, also contribute notably, and all discovered within a short time that initiative and organising capacity were being taxed to the utmost. The men who made the scheme successful ceased advisory work overnight and were required to adjust themselves to coping with the following tasks: the selection of suitable land and completion of lease arrangements; the location and delivery of equipment and materials; the initiation of vegetable production schedules; the organisation of labour; and the arranging of supply.

LAND AND EQUIPMENT

Eventually there came into effective use over 4,000 acres located conveniently in relation to supply. Most of the land was freely offered on lease at varying rentals with generous covenants providing for satisfactory restoration to lessors. In some areas several landowners were involved, and not all were prepared to see a vegetable farm arise from their grass fields. Consequently some of the land was requisitioned under War Emergency Regulations, the rental and terms (which were unexpectedly gratifying to the lessors) being fixed by arbitration proceedings.

Reference is made later to the existence of certain contracts among established growers especially at Pukekohe, to provide supplies during the initial stages of SVP and to supplement the overseas pool. Apart from the contract areas none of the land was under cultivation at the start, but readily convertible pasture land in good heart was sought, although on two areas extensive stump clearing operations became a necessary and costly preliminary.

During the first few months all manner of secondhand equipment was offered at exorbitant prices, and it was not until after the first very difficult year had been completed that equipment adequate in capacity and number came to hand from the U.S.A. Seeds and fertilisers were drawn from existing supplies. Containers, which were desperately short at the end of 1942, eventually arrived in abundance through the assistance given by the State Forest Service. Suitable buildings were essential and much effort was spent in urging the Public Works Department, already harassed by a mounting emergency programme, to expedite SVP constructions. By the middle of 1943 production areas had acquired a business-like appearance and were typically provided with married men's cottages, single cottages, mess and ablution units, implement and store sheds, and packing sheds. Four projects each comprised over 400 acres and on these the erection of large residential buildings became necessary to accommodate the considerable force of men and women employed.

LABOUR SUPPLY

At the end of 1944 just over a thousand permanent field workers were engaged, about half of them being women. Members of the Women's Land Army being fully occupied in other farming operations were not available for SVP work, and it is difficult to imagine how the programme would have fared had not women of diverse peacetime callings responded. Splendid work was performed by women who cheerfully went to the projects from drapers' shops, beauty parlours and city offices. They found the vocation of field gardening healthy and interesting; and they usually became efficient at their tasks after a few weeks' experience. Indeed much could be written of the diverse callings from which the staff was drawn. It was an example of food production by enthusiasts rather than by experts, for the scheme did not draw upon specialist labour at the expense of the established industry. Maori people rendered invaluable service, notably at Rotorua and Otaki. Elsewhere peak harvesting was expedited by gangs of varied form and colour: at Greytown some sixty or seventy Japanese prisoners of war arrived daily under escort. They worked about as hard as men ever work when they have neither personal nor material interest in what they are doing. From sullen scarecrows they became genial human beings, the change being wrought largely by a balanced army diet which the authorities concerned could well have used as the basis of a striking experiment in human nutrition.

An SVP Workers' Agreement on union lines appeared almost before the first vegetable deliveries, and provided acceptable conditions for all groups of employees except for some who were outside the scope of the agreement. Generally, however, labour relations were amicable.

PRODUCTION OF VEGETABLES

When the scheme terminated in 1945, 46,000 tons of vegetables had been delivered to the forces. This was war production as much as the manufacture of clothing and munitions, except that profits were restricted. Production programmes were projected for months ahead, only to be made to look foolish at crop maturity through vast changes in military establishment—changes that were unknown until it was too late to alter the field plantings. The American locally-based consumers were fickle and often made demands which on fulfilment proved unacceptable. As indicated earlier, contracts with established growers had been arranged to cater for some special lines and to augment the Overseas Supply Pool. Most contractors were fully cooperative, although there were some notable instances in which the full contract was demanded of the State Exchequer when surpluses existed and, on the other hand, in which growers' 'contracts' were not fulfilled when certain vegetables were commanding better prices on wholesale markets.

Eventually SVP projects delivered regularly up to twenty-two different types of vegetables, potatoes excluded. Table II covers representative months when the scheme was in full operation and serves to illustrate the range of deliveries.

There were several production difficulties of a major order. Firstly came the problem of maintaining a supply of all types of vegetables over the full twelve months period. Few market gardeners, even in the most favoured places, are interested in, or capable of achieving an all-the-year-round cabbage supply. It was some time before projects were able to achieve this objective by the proper use of successional sowings and plantings of varieties adapted to the seasonal cycle. In ordinary commercial vegetable production growers normally concentrate on a few crops which are particularly suitable to their soil and climate. With the produce markets and wholesalers acting as a collecting pool a full range of vegetables from many sources is available to consumers.

TABLE II

DELIVERIES FROM THE PROJECTS *(in lbs.)*

	SUMMER PERIOD (February 1944)	WINTER PERIOD (August 1944)
Beetroot	260,648	55,463
Brussel Sprouts	—	245
Cabbage	1,783,384	508,442
Carrots	562,137	1,055,629
Cauliflower	43,820	79,506
Celery	31,473	3,615
Leeks	21,518	57,147
Lettuce	69,448	4,106
Marrows	255,560	60
Onions	43,000	1,713
Parsnips	8,405	118,013
Pumpkins	69,592	6,487
Radishes	3,852	1,460
Rhubarb	24,108	1,248
Silver Beet	52,262	23,089
Swedes	56,592	263,242
Turnips	70,868	32,120
Spinach	10,377	190
Beans	303,493	—
Cucumbers	154,912	—
Peas	79,439	—
Corn	49,776	—
Tomatoes	900,906	—

On SVP areas an endeavour was made to cater for the full requirements of local troop concentrations; this was the cause of many production difficulties. Nevertheless certain specialisation was developed, notably in utilising the soil and climate of Ohakune to develop a project chiefly concerned with a long-season cabbage supply. Specialisation also characterised several of the contracts made with private growers, notably in supplementing the supply of celery, carrots and onions.

Secondly, seed quality was not always good, and in some lines became positively scandalous: white carrots appeared among red types; cauliflower plantings gave rise to small and large cabbages, curly kale and other monstrosities not yet accorded a place in the systematics of the plant kingdom. One particular seed firm interlineated among descriptive material in their advertising matter red-printed innuendos and scornful gibes concerning 'government vegetables', and exhorting home gardeners to buy this firm's seed and grow their own, rather than suffer from the low quality of 'state farm produce' which, in times of surplus, occasionally reached the markets. If the home gardeners had the same experience as SVP with some of these seed lines they must have been sorely perplexed. An interesting sidelight was the direct importation from the U.S.A. of a large quantity of guaranteed vegetable seed. This came to New Zealand as a 'munition of war' through U.S. Navy channels. The arrival of the seed created something of a sensation, and in due course some of the seed reached SVP projects.

The third major difficulty was the control of diseases and pests. The large areas under crops provoked disease and pest problems of a serious extent, and on occasions losses in quality and quantity became disastrous, notably from cabbage soft rot in transit, insect damage in cabbage, bean anthracnose and tomato blight. The advisory services of the Plant Diseases Division, Auckland, did much to combat the disease problem especially when the division was able to provide instructional courses for project staff deputed to attend the disease control programmes.

Supply of Produce

Arrangements with permanent military establishments worked well under a system whereby the military officers placed orders in the light of notice given of the succeeding week's vegetable expectations. For a time the Americans were inclined to seek lines which were non-existent, but after they had become accustomed to New Zealand habits they were happy to use cabbage, carrots and lettuce instead of sweet corn, egg plants and spinach. Supply arrangements often failed because of difficulties on the railway system especially when shortages in one district called for long-distance shipments. Perishable vegetables sometimes travelled in open waggons under tarpaulins or were left forlorn on back country sidings. As a result of such occurrences shipper and receiver were sometimes involved in disputes on the score of weight discrepancies.

Overseas supply was complicated by the unknown movements of shipping. A crating pool in Auckland enabled a stock of nonperishable produce to be established, but the sudden arrival of food ships for the Pacific Islands changed overnight a condition of calm into a state of near-panic when there were frantic demands for containers, for vegetables, for labour to harvest by moonlight and for priority railway express goods service.

The unfortunate experience of SVP surpluses on wholesale markets saddened the hearts of many, for when the surpluses were created through unexpected changes in military demand, instructions were given by the political guardians of the scheme that the vegetables must not be wasted. To obey this order meant undeserved trouble for project supervisors. Some produce was certainly wasted, but the markets were able to absorb most surpluses without injury to the private growers' market. The SVP container brands were, however, 'sure game' and provoked auctioneers to demonstrate that the vegetables were 'government stuff' and of course not in the same price bracket as regular produce. This was quite true for some of the produce but a great number of the consignments were better. Hospitals and institutions gratefully received surpluses at nominal charges, and canneries must also have enjoyed profitable transactions on account of the price at which they took delivery of surpluses.

SVP Achievements

The troops received approximately 40,000 tons of fresh vegetables from SVP projects in a period of less than three years, including that first summer when development was under way. This quantity was supplied at a cost of production a little more than 2d. per lb. over the full vegetable range offered. The original objective had been to produce vegetables at the overall price of 1d. per lb.

Project efficiency varied and was estimated in relation to the excess value of vegetables delivered (at the services' purchase rate of 2d. per lb. overall) over wages, thus leaving a margin to pay for other working expenses and providing a reserve for depreciation on equipment and buildings. This efficiency index was subject to influences which occasionally did injustice to actual project efficiency. However on this basis, and after two years, twelve of the projects consistently reached over 100 percent in the vegetable value-wages index, five recorded over 75 percent and ten less than 75 percent but not lower than 50 percent. The scheme demonstrated the requirements of successful large-scale mechanised vegetable production. There is now on record on departmental files a wealth of information on techniques for preparing new land for vegetable growing, on requirements for twelve months production of basic lines, on the necessary adaptations of cultivating and harvesting gear, on labour saving devices, and on the organisation of vegetable gang labour and piecework standards. The whole scheme was a venture, and each project became an experimental unit, so much so that officers commenced to organise experimental programmes even while the all-important production task was continuing. As a result new knowledge was acquired on fertiliser practices and methods of application, prevention of mineral deficiency troubles, large scale plant propagation techniques, maintenance of organic reserves, weed control, and variety performance. There is no record yet of accurately computed commercial vegetable production costs, but the projects kept detailed records, and the filed costings supported by full details will at least provide a start for future costing studies.

Such were the work and achievements of Services Vegetable Production, a state enterprise, a cooperative prodigy and a human drama—the drama fortunately interspersed with comedy for those participants with a little sense of humour. Many contended in 1942 that the money authorised, the land, labour and materials should have been made available to the existing industry so that private enterprise could develop or expand and meet the need on some kind of contract basis. A large sum of money was spent on SVP under departmental control, but how an alternative scheme under the control and direction of a rather ill-organised industry could have succeeded is beyond answer. The market garden industry would most certainly have had to adopt an administrative organisation more or less along the lines of SVP—with some exceptions of course. The industry would have lacked the 'advantage' the Department of Agriculture had with its loyal but inadequately paid and overworked public servants, many of whom were moved four or five times from one end of the country to the other. It is unlikely that the established industry would have been able to accept the extraordinary fluctuations in demand without insisting on full payment for contracts, and in all respects it is unfortunate that one cannot compare the expenditure on SVP with the probable cost of delivering 40,000 tons of vegetables to the forces produced by large numbers of small growers working under the same circumstances.

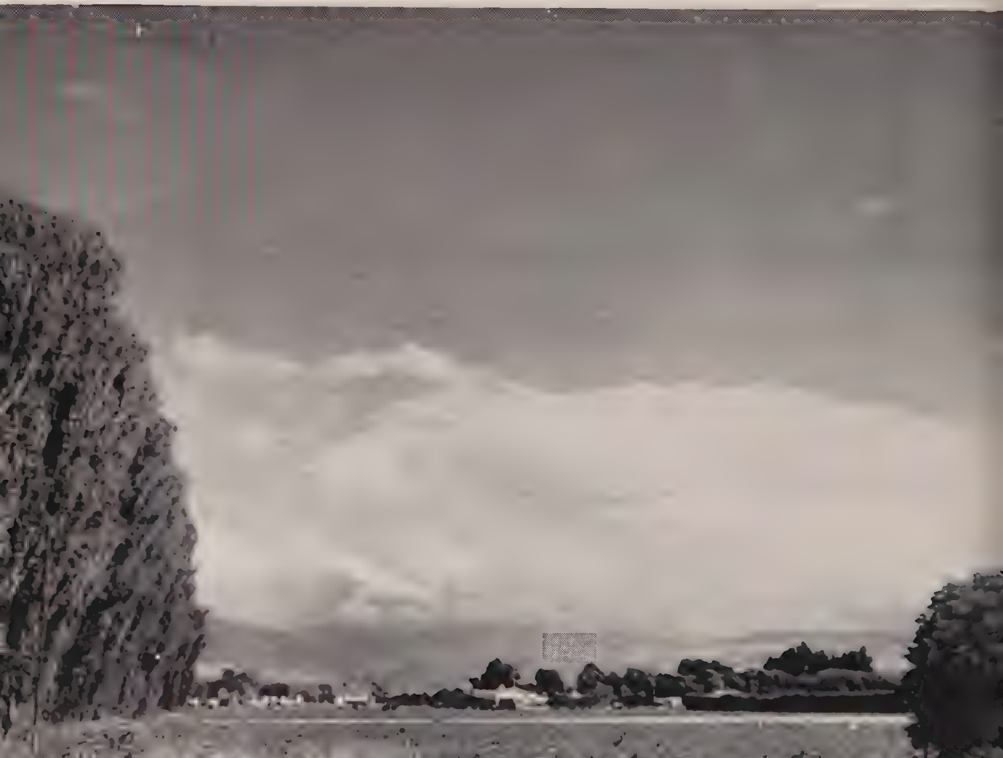
The land has been returned with enhanced fertility to the dairy farmers; the War Assets Realisation Board has disposed of buildings and equipment; the men and women retain the scheme only as a memory of varying hue. The Department of Agriculture has little to regret concerning its supervision of a scheme which arose from an allegedly fantastic idea. The department did however drop the scheme with great alacrity, and unfortunately it has so far not given to those interested the benefit of lessons learned and facts recorded on the technical side. Another department which was an interested observer of the problems revealed during the nurture of SVP has, however, taken up an organised investigation into the problem of vegetable seed quality. But no matter which agency continues these investigations it is clear that if the vegetable-growing industry has recovered a certain loss of pride, it can well benefit by consideration of the mistakes, difficulties and successful innovations that became apparent while the growers were critical (but perhaps secretly relieved) observers of Services Vegetable Production from its sickly birth to resounding eclipse.

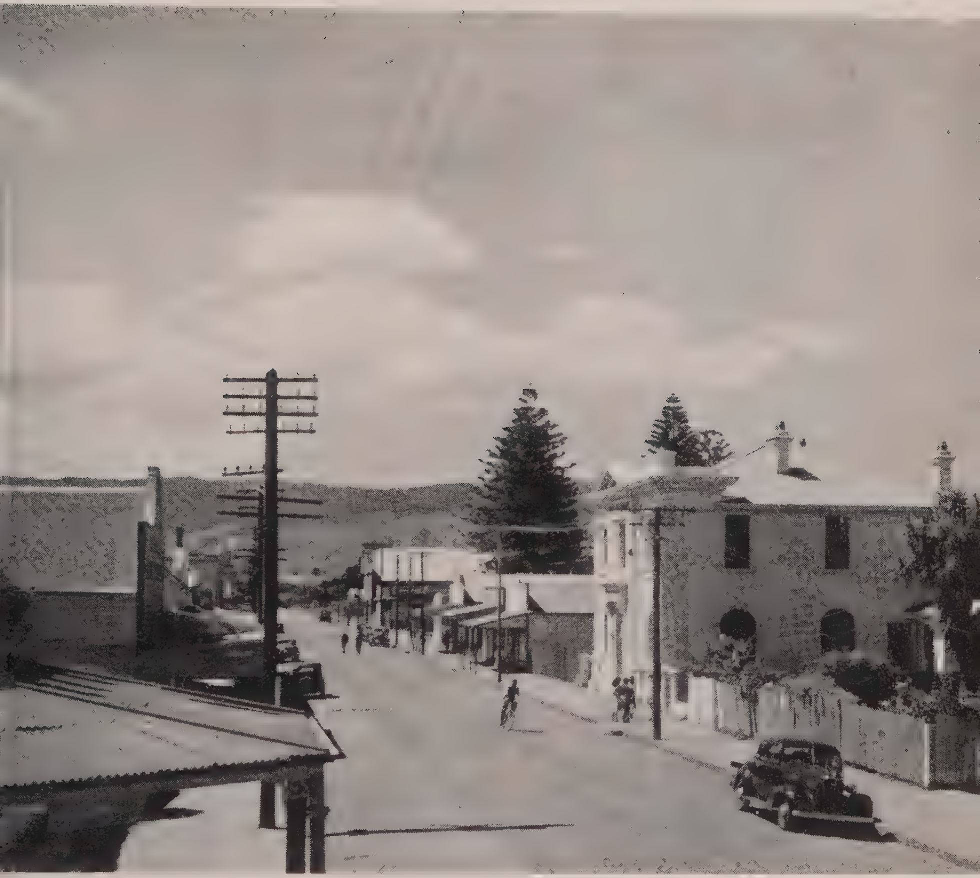
PHOTOGEOGRAPHY

A PICTORIAL SURVEY OF NEW ZEALAND

1. SVP: MARKET GARDENING IN WARTIME

Fig. 1. *One of the areas chosen for wartime vegetable production by the Department of Agriculture was the Horowhenua coast plain, a narrow strip of low coastal country backed by the Tararuas.*

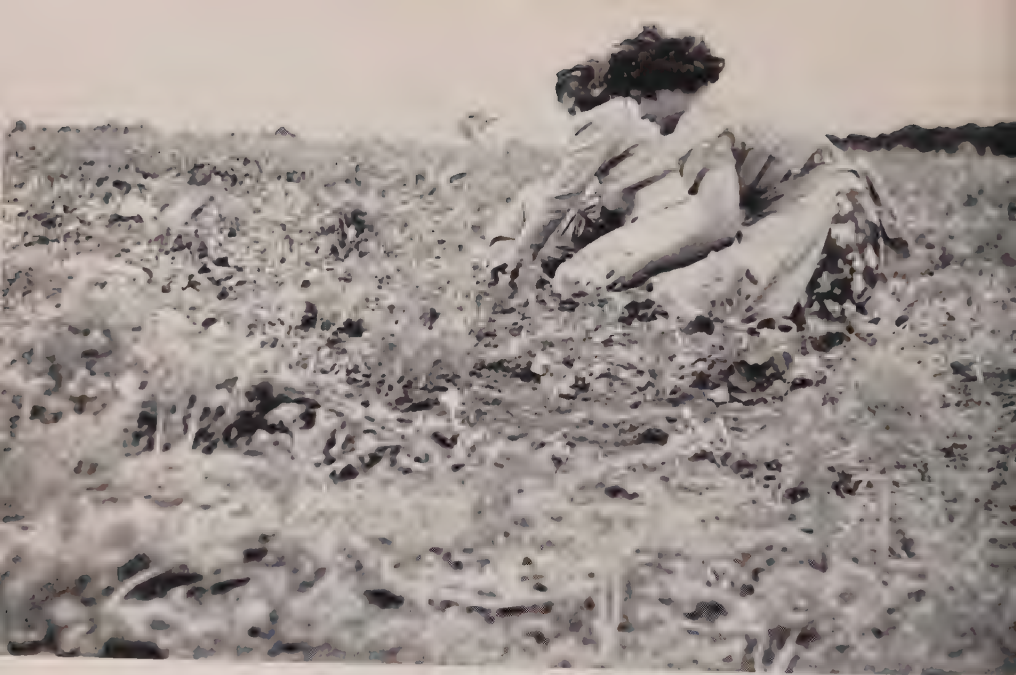


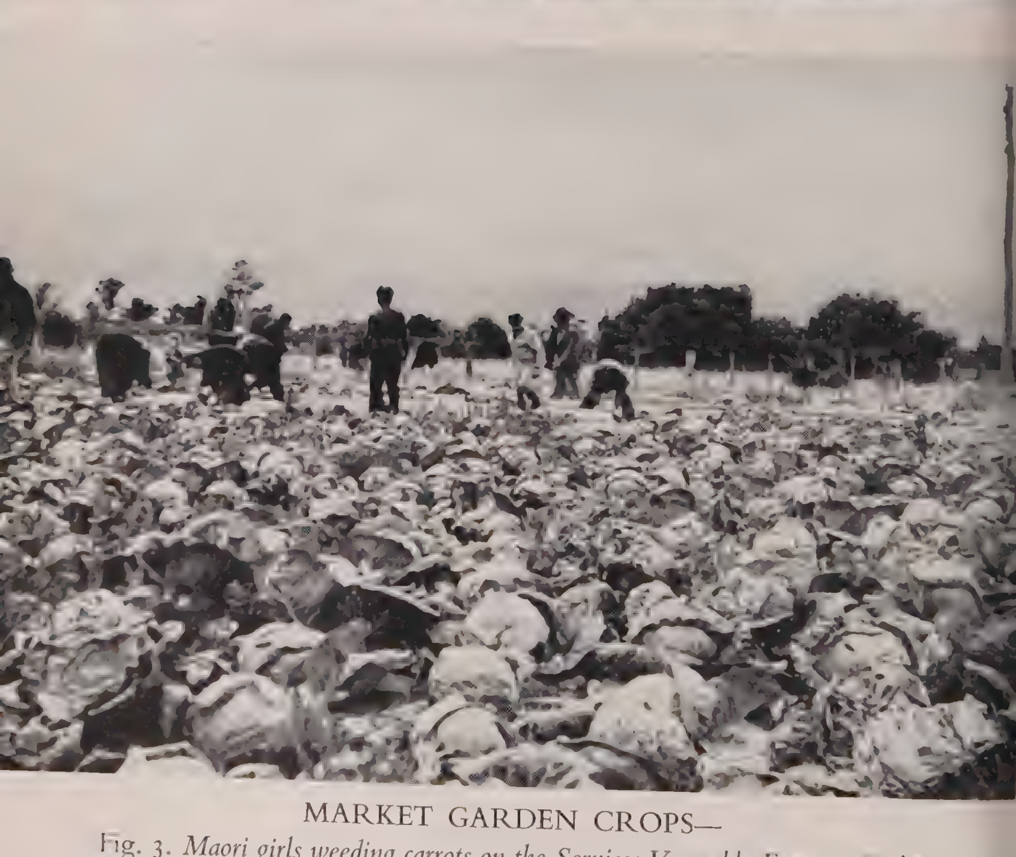


THE COUNTRY—
—AND THE TOWN

Fig. 2. *Mainstreet, Otaki, a township of a little over 2,000 people, on the main trunk railway, and the centre of a region of intensive dairying and market gardening.*

IN SOME OF THE WAR YEARS John Pascoe took photographs for he New Zealand Department of Internal Affairs. These were sent overseas and some of them were published in Australia, the United States and England. They are an honest record of how New Zealanders live and work, and provide a contrast to posed propaganda pictures that all too often pass as publicity. Much of Mr. Pascoe's work has a geographic background, and the New Zealand Geographer *is fortunate in being able to publish here, and in he future, selected series of his photographs. It is intended to accompany the llustrations on each occasion with texts written by competent authorities.*

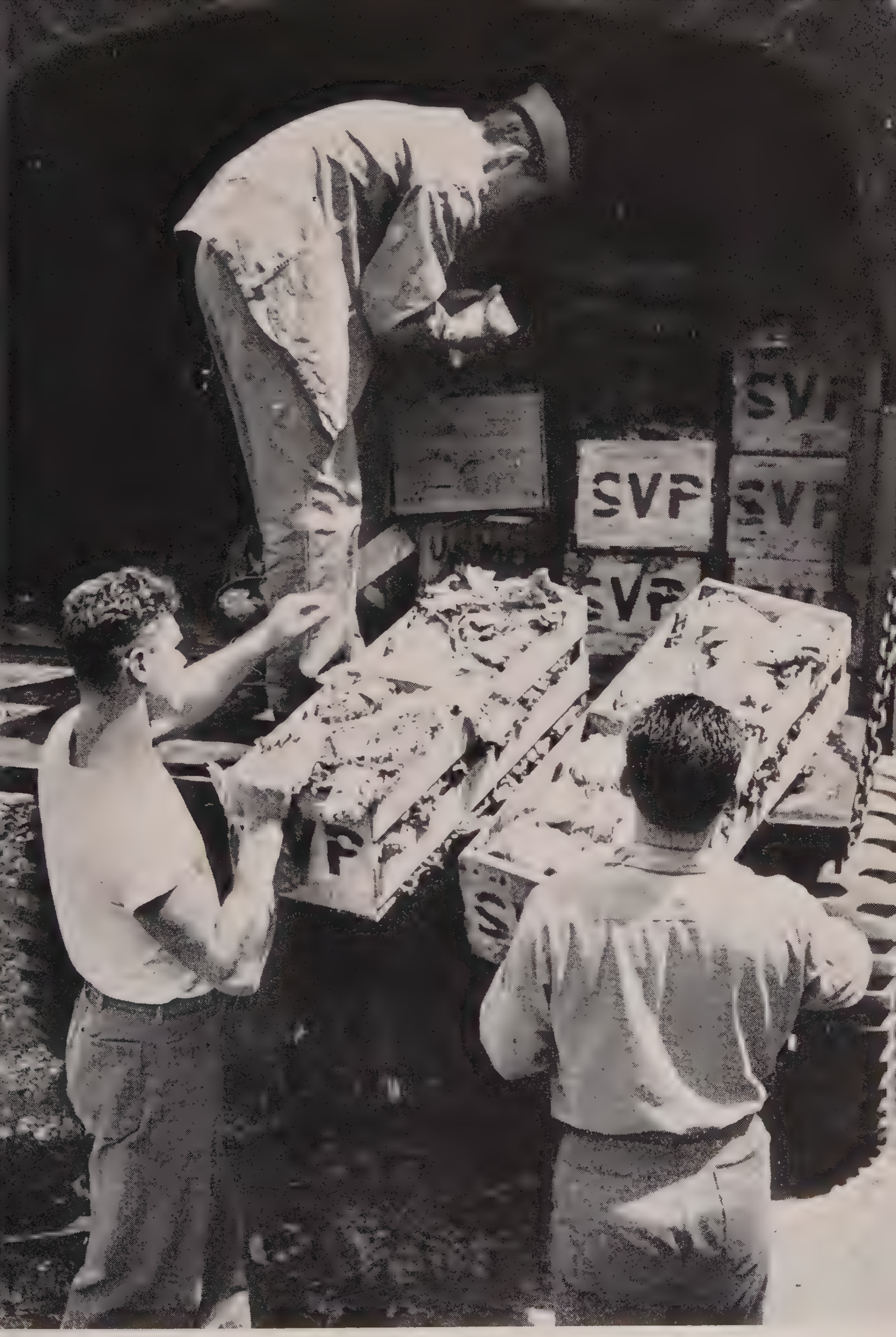




MARKET GARDEN CROPS—

Fig. 3. *Maori girls weeding carrots on the Services Vegetable Farm at Otaki.*

Fig. 4. *Harvesting a heavy and successful crop of cabbages grown in New Zealand for United States' forces serving in the Pacific theatre in 1943.*



—THEIR DESTINATION

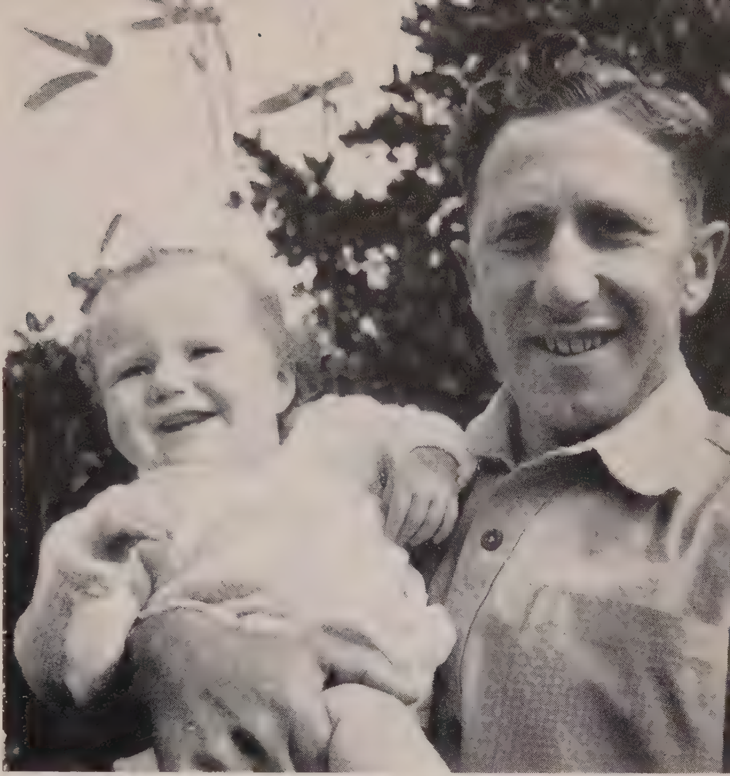
Fig. 5. *Unloading choice lettuce at the New Zealand camp of United States Marines. Healthy foodstuffs of this sort were one form of Reciprocal Lend-Lease.*

CONSUMERS

Figs. 6 and 7. *Vegetables were carefully inspected before being trucked or railed to camps or shipped overseas. Only first grade produce was accepted at camps, canneries or dehydration plants.*

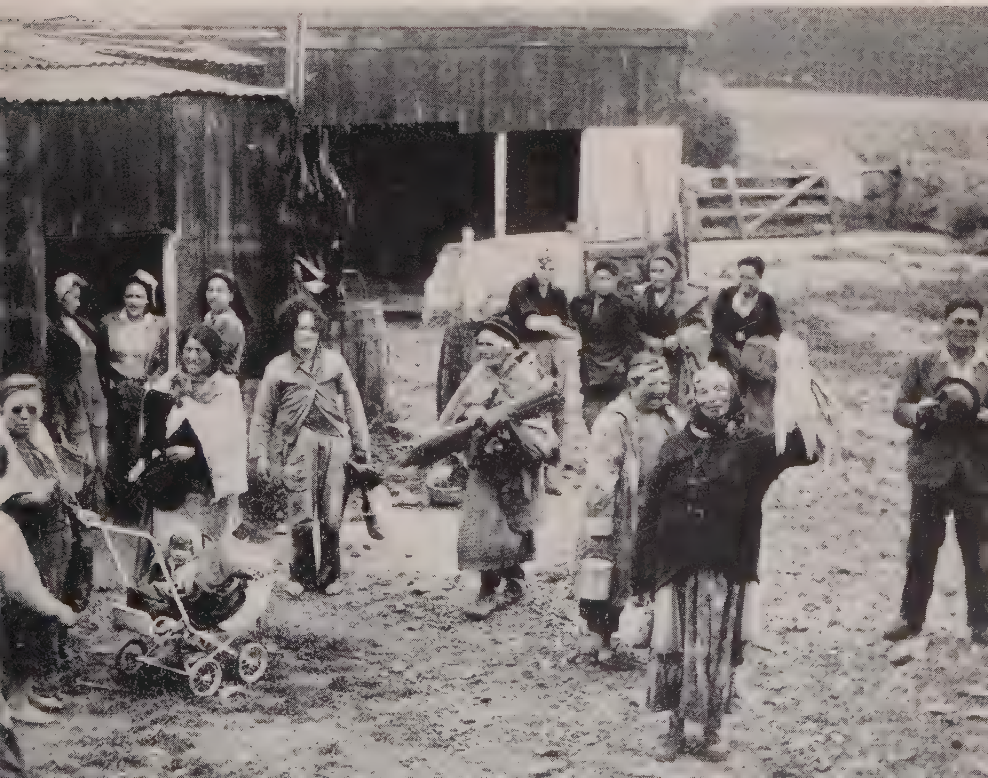
FIELD
NSTRUCTOR
and Child

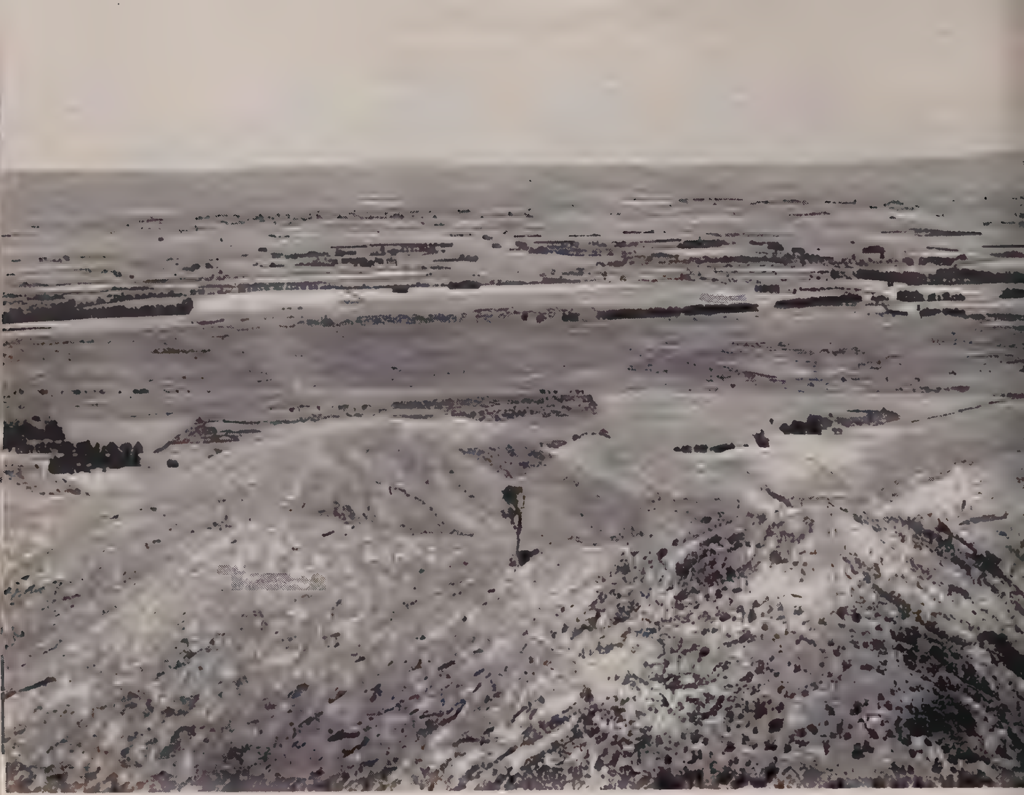
g. 8. *New Zealand*
o contributed technical
lls and advice. This
mber of the Depart-
nt of Agriculture staff
l the responsibility of
pervising a series of
etable garden projects.



WORKERS

Fig. 9. *Maoris of three generations, mainly womenfolk complete their day's work on the Otaki vegetable farm while their menfolk fight on the North African front.*





CHANGE OF SCENE

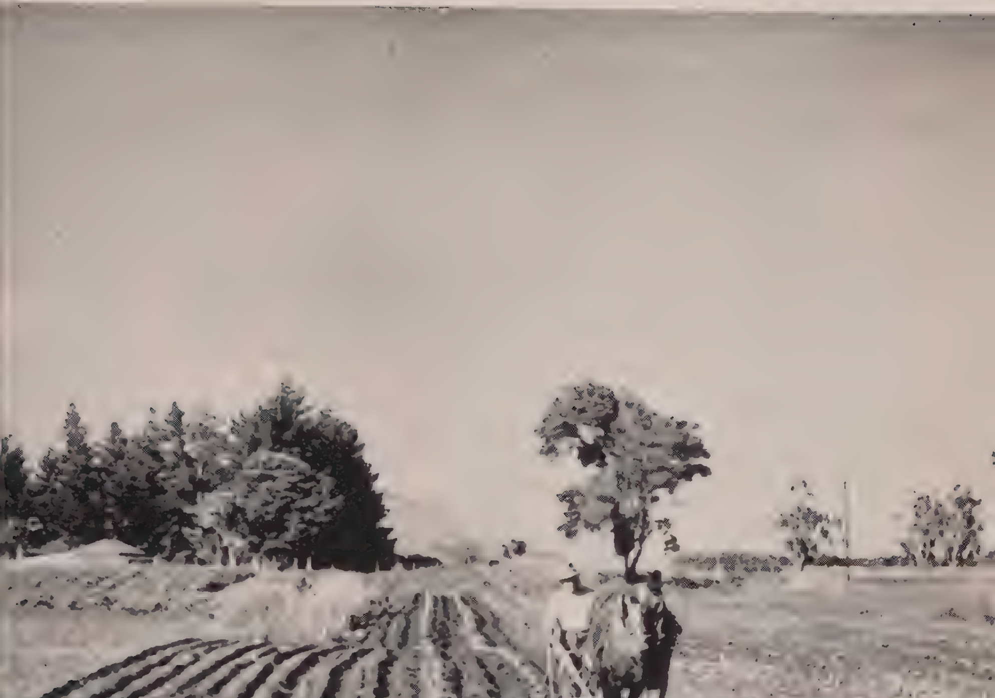
Fig. 10. *In the Wairarapa valley—at the other side of the ranges in* Figure 1—*was a wartime vegetable growing establishment of a rather different kind.* Fig. 11. *On the floor of the valley was located the camp of Japanese prisoners of war, some of whom were employed locally on another state market garden.*

PRISONERS OF WAR

Figs. 12, 13 and 14. *Japanese prisoners of war in the Wairarapa planting cabbage and tomatoes under careful guard, and racing to the cookhouse after the morning's work.*

MAORI
&
PAKEHA

Figs. 15 and 16.
of the labour emp
on the Services Vege
Production establishm
was seasonal, alth
there had to be a nu
of permanent gard
and organisers.



PRIVATE ENTERPRISE

Fig. 17. *Near Otaki and in other parts of the dominion, Chinese market gardeners are in peacetime responsible for a large share of the production of New Zealand's domestic vegetable requirements. This Chinese vegetable grower added his quota to enhance wartime demands, and with the return of peace he and the other private producers have a thriving industry to themselves again.*

All photos: John Pascoe
for the New Zealand Department of Internal Affairs.

NEW ZEALAND GEOGRAPHICAL SOCIETY: BRANCH AFFAIRS

CANTERBURY BRANCH

OFFICERS for 1948 are— *President*: Mr. J. Acland
Vice-Presidents: Messrs. A. E. Flower, D. McLeod, and W. S. MacGibbon
Chairman: Mr. J. L. Hewland
Secretary-Treasurer: Mr. A. V. Barley
Hon. Auditor: Mr. W. Rosenberg
Committee: Miss M. Aitken, Mr. Y. T. Shand, Mr. A. C. Pitcaithly, Mr. H. M. Sweney

The Annual Meeting of the Canterbury Branch, 1947, concluded with an Open Forum discussion on 'The Development of Canterbury'. The members of the Forum were: Mrs. R. deF. Bedford, Messrs. D. McLeod, A. J. Danks, T. H. Langford and L. W. McCaskill. A lively and interesting discussion resulted and it is hoped to hold a similar Forum in 1948.

We offer our sincere congratulations to Mr. W. P. Packard who has been chosen as one of the two Rhodes Scholars for 1947. Mr. Packard plans to leave for England about June 1948 to commence his studies at Oxford University.

We also congratulate Mr. K. W. Robinson on his appointment to a teaching fellowship at the University of Sydney, and Mr. J. H. Martin, who has been appointed Lecturer in Geography at the Auckland Teachers' Training College. Both are members of long standing in the Canterbury Branch, and our best wishes go with them.

We also regret losing Mr. G. H. Lawton but congratulate him on his new appointment. The branch welcomes Dr. R. O. Buchanan who will be with us during 1948.

WELLINGTON BRANCH

OFFICERS for 1948 are— *President*: Mr. D. I. Macdonald
Vice-Presidents: Dr. R. A. Falla, Dr. P. Marshall, Dr. J. T. Salmon, Mr. C. G. Bloore
Chairman: Mr. N. E. Dalmer
Secretary: Miss J. K. Finney *Treasurer*: Miss B. Page
Publicity Officer: Mr. D. W. McKenzie *Hon. Auditor*: Mr. T. L. James
Committee: Mrs. S. S. Turowski, Mr. G. Anderson, Mr. R. P. Graham, Mr. W. B. Harris, Mr. R. J. Waghorn

In 1948 lectures are again held on the third Wednesday of each month, from March to October inclusive. The film evenings held in 1947 proved so popular that they are to be a permanent feature of the programme and will be held on the first Wednesday of each month from May to August inclusive.

An attractive programme including topics by overseas as well as New Zealand speakers is planned for this year, and the policy of arranging special public lectures in addition to the regular branch meetings is to be continued.

We extend a welcome and offer congratulations to Dr. R. A. Falla, recently appointed Director of the Dominion Museum.

AUCKLAND BRANCH

OFFICERS for 1948 are— *President*: Mr. L. K. Munro

Vice-Presidents: Professor V. J. Chapman, Dr. G. Blake Palmer, Sir Albert Ellis, Professor J. A. Bartrum, Professor H. R. Rodwell

Chairman: Mr. G. G. Harvey

Deputy-Chairman: Mr. R. A. Watson

Hon. Secretary: Mr. A. L. Ferguson *Hon. Treasurer*: Mr. R. M. J. McDermott

Hon. Auditor: Mr. J. K. Bedbrook

Committee: Mr. N. Pountney, Dr. K. B. Cumberland, Mr. J. W. Fox, Miss I. Kirk, Mr. A. R. Harvey

The Committee is arranging an attractive programme for 1948 and it is hoped that the branch will have increased activity and membership. In addition to the ordinary lecture programme, some film evenings and a 'Brains Trust' evening have been arranged. In addition the Annual Meeting of the Society will be held in Auckland.

A Geography Teachers' Study Group has been formed within the Branch in Auckland. It is hoped that this group will meet a need. Country teachers of geography will be informed fully of its activities by newsletter.

OTAGO BRANCH

OFFICERS for 1948 are— *President*: Mr. B. J. Garnier

Past-President: Dr. B. H. Howard

Vice-Presidents: Mr. P. G. Connolly, M.P., Mr. A. H. Payne, Mr. G. Simpson

Chairman: Mr. E. Hayes

Secretary-Treasurer: Miss D. M. Martyn

Hon. Auditor: Mr. G. S. Kirby

Committee: Mrs. R. R. McNeill, Miss L. Voller, Mr. N. Dew, Mr. W. E. Earnshaw, Mr. H. I. Sinclair, Mr. D. Sage

The General Meeting of the branch for 1947 was held on 22nd October, when Dr. B. H. Howard delivered the Presidential Address on 'The Mapping of Otago'. During 1948 lectures are to be held on the last Wednesday of each month from April to October.

In December, the Cartographic Committee, convened by Dr. Howard, published the results of its work in booklet form under the title 'The Mapping of Otago'.

The branch has undertaken several activities in connection with the Centenary of Otago. 'The Geography of Otago' has been produced, a series of broadcast talks by members has been planned, and a subcommittee has undertaken to organise, later in the year, a public display of maps of Otago, old and new.

A few members resigned at the end of 1947, and the Committee is conducting a vigorous membership drive to ensure that the branch will increase its numbers during 1948.

GEOGRAPHIC NOTEBOOK

ELECTRIC POWER SUPPLIES. The report of the State Hydro-Electric Department for the year ending 31 March 1947 is an illuminating document. Light shines in the darkest places: official explanations are here describing why power cuts have been necessary and why steam or diesel generating plants are not suitable to New Zealand's present needs. Yet all the picture is not dark: here also are official reports on the schemes afoot that have elsewhere been given the widest publicity, and there are diagrams showing how the Waikato River and Lake Waikaremoana will be further harnessed.

In the North Island a total of 1,718 million units were generated in 1946-1947, an increase of five percent on the previous year. Of this amount, government-owned plants produced 1,518 million units, 96.3 percent of which came from hydroelectric power stations. The steam plant at King's Wharf, Auckland, generated most of the remaining 3.7 percent, heavy demands being made on that station during the winter months. The output from Arapuni on the Waikato was the greatest of all hydroelectric stations, followed next by the Lake Waikaremoana group. Horahora continued to run at maximum output until 4 April 1947, when it was permanently closed down because of impending submergence by the newly-formed Karapiro Lake.

In the South Island, too, auxiliary plants were called into use, most of them being small and operated by steam power. Of the government-owned hydroelectric stations, the Waitaki installation generated practically fifty percent of the total, whilst the Dunedin City Corporation plants of all types produced almost twice as much as the Arnold and Monowai stations put together. The total number of units generated in the South Island was 753,000,000, an increase of ten percent compared with the year 1945-1946. It is interesting to note that Arapuni could have supplied the whole of the South Island with electricity on the basis of production and consumption.

In all New Zealand produced in 1946-1947 ninety percent of her electric power by means of hydroelectric plant, and the remaining ten percent by steam and diesel installations. That the percentage was 94.5 in the year 1943-1944 is indicative of the overloading of the system during periods of peak demand or poor hydrologic conditions. Development is proceeding, but it is open to question whether it is keeping pace with the rapidly increasing demand. The establishment of secondary industries in the ports and larger towns, and the consequent expansion of urban population, have both created a demand for electricity greater than was officially envisaged before the war. The war has delayed the construction of new hydroelectric stations and has seriously hampered maintenance in existing installations—a factor which is illustrated by the lower production in 1946-1947 of much of the older plant.

The question now arises whether the existing and projected schemes are sufficient, either in themselves or as a whole, or whether more auxiliary enterprises are necessary. As the report points out, the operating costs of fuel-driven plant in New Zealand are much higher than those of main hydroelectric installations, for coal is costly and in erratic short supply, and diesel oil must be imported. The small stocks of coal at the King's Wharf power station are evidence of the difficulty of obtaining coal, and are such as to render steam-operated plant almost valueless, for fires must be kept alight and banked in case of emergency. If a station is forced to limit its output because the coal stock may be exhausted it cannot play its part efficiently as a standby, and even less so as a main generating station. The answer would seem to lie in the words of the report: 'The stage has been reached where the load demand has overtaken the dry season capacity of the hydroelectric stations . . . . . Under these conditions it seems necessary to exercise a measure of control over the rate of growth of load and to speed up the rate of construction of the hydroelectric stations. It is far beyond the ability of the fuel stations to overtake the shortage . . . . .'

What are these construction schemes? In the North Island there are two, the Waikato River and Lake Waikaremoana. In the first a total installed capacity of 835,000 KW is planned; of the ten projected stations between Lake Taupo and Cambridge, Arapuni is operating fully, Karapiro almost so, and Maraetai is under construction. Of the Lake Waikaremoana stations, Piripaua and Tuai are already in harness, whilst the Kaitawa station is nearing the installation stage. A total of 124,000 KW will be generated under this scheme. In the South Island preliminary survey has been commenced on the greatest project of all at Roxburgh on the Clutha River, where the installed capacity will eventually be 320,000 KW. At Lake Tekapo and on the Cobb River schemes are being pushed forward as rapidly as possible to produce a further 45,000 KW, whilst at Lake Pukaki a storage dam is being built to supplement the flow to the Waitaki power station in winter.

When all is complete New Zealand will have a hydroelectric power development which, relative to its size and population, will be unequalled in the world. That the government should concentrate on this form of power is obvious when the low output of relatively poor quality coal is considered and when it is appreciated that all oil must be imported. Yet there are dangers in this policy. Firstly, New Zealand is not immune from earth tremors and a severe shock may cause irreparable damage. The report states that slight cracking occurred at the Lake Coleridge station in June 1946 and repair work lasted until September. The Waikato flows through the heart of the volcanic plateau and the pumice land. The effect of one bursting dam would be cumulative, especially if the others were weakened too. That the North Island will have almost all its eggs in the Waikato basket is no exaggeration.

Secondly, rainfall is remarkably inconsistent both in incidence and amount, and in the dry season between January and March each year, lake levels fall rapidly. Only forty percent of the average precipitation fell at Lake Taupo from January to March 1947, so that only one fifth of the storage remained, whilst at Lake Waikaremoana only three feet of storage could be drawn upon. Cuts were therefore imposed on all consumers of electricity. Similar conditions were experienced in the South Island, although at Monowai water was run to waste because most of the rainfall was concentrated into the five months August to December. Although their collecting grounds extend back to the main alpine divide, it is perhaps not insignificant that most of the South Island stations are located in areas of low rainfall: Lake Coleridge 35.2 inches, Waitaki 19.7 inches and Monowai 45.3 inches. The Coal Creek project at Roxburgh is to be constructed in the driest part of New Zealand, for central Otago receives barely 15 inches of rain a year.

The development of power resources in New Zealand is an unenviable task. More and more electricity is demanded as reticulation is advanced and more consumers are connected. Engineers push on as hard as they can, but to no purpose when the rains fail. Power cuts bring vituperation upon the government. A policy of self-sufficiency is paramount. As Mr. Semple says in this report 'under present world conditions it is very desirable that the electric supply of this country should be independent of imported fuel, and to this end we should develop the natural resources with which the country has been generously endowed.'—J. W. Fox.

SOCIAL STUDIES THROUGH GEOGRAPHY. Various attempts are being made to reconcile geography (and history) with 'social studies'. In the revised syllabus for primary schools, one such attempt is called 'Social Studies in History and Geography'. At the teachers' refresher course in geography in January, 1948, another was termed 'Geography through Social Studies'. This variety of nomenclature and aim is a welcome if indirect sign that it is becoming generally realised that there is no separate subject which can be labelled 'social studies'. It is becoming more widely appreciated that those facts which have been included under this heading can and should form part of the course in history or geography if correct interpretation is given these subjects, and if better methods of teaching them are used.

In an address to the Canterbury Science Teachers' Association in July, 1947, (Canterbury Science Teachers' Association *Bulletin*, August, 1947), Dr. H. N. Parton, Associate Professor of Chemistry at Canterbury University College, dealt with the question, 'Can there be "General Science"?'. He stated that among the list of thirty odd subjects we find general science, the progeny (to the eye of a modest student of a single science) of New Education out of Muddled Thinking. In fact, the one thing missing in the Thomas Report is General Language. Later in his statement we find this: 'The critics have supposed that the way to make science teaching relevant is to abolish the teaching of science by subjects and to teach general science. The view is held that there is something pedantic and arid in teaching single sciences at school, and that everything from astronomy to hygiene should be "integrated" in one grand old sweet song'. Dr. Parton concluded by asking his audience of teachers, 'What do you mean by integrate?' and 'If it has a meaning, how are you doing it?'

Teachers of history and geography will feel immediately that Dr. Parton has spoken for them too. As they struggle in a vain endeavour to teach 'the outlines of the human geography of the world' to their unfortunate school certificate candidates, geography teachers will feel that Dr. Parton spoke again for them when he said: 'It [a science course] will have to be a course which puts method above "facts". The factual content might be reduced. Better teach a little thoroughly than fail to teach a lot'.

If then we agree that scientific method is important, and turn to the new primary school syllabus, we find the following: [Std. 3] 'It is important to stress the influence of climate on man's activities'; and [Form 1] 'The effect of relief and climate on man's activities (associated with all topics in this class)'. Does this wording suggest that the efforts now being made in postprimary schools to improve the methods of teaching geography will have to be redoubled in order to overcome a reactionary and dogmatic environmentalism taught in the primary schools? Or do these words amount merely to an unfortunate and unnecessary addition to a syllabus that could otherwise be the basis of some excellent elementary geography?—J. L. Hewland

COAL PRODUCTION AND SUPPLY. From 1934 to 1945 the production of coal of all kinds from New Zealand mines showed, with one exception, a steady and creditable increase. Only in 1938 was there a break in this rise in output. In twelve years the annual production rose from 1,821,258 to 2,833,576 tons, an increase of no less than 56 percent. In 1946 however production was down on that of the previous record year by more than 27,000 tons.

The situation however is not nearly so satisfactory as these crude figures would suggest, and this is clearly revealed by the *Mines Statement* for 1947. Since records were first kept New Zealand has produced a total of 112,000,000 tons of coal, or little more than half the 1947 production of the United Kingdom and less than a fifth of the annual yield of United States mines. Of this total 54 percent has been bituminous coal, 39 percent subbituminous and 9 percent lignite. But in 1946 bituminous coal represented only 33 percent of the year's production; subbituminous kinds however accounted for 56 percent and lignite for more than 10 percent. On this basis it is doubtful whether the calorific value of the higher tonnage produced in recent years is any greater than the lesser tonnage of, say, ten or twenty years ago.

Perhaps the most significant feature of the coal mining industry in the dominion in the last few years has been the development and expansion of opencast production. From a little over 16,000 tons in 1935, the output of opencast workings has expanded to no less than 529,000 tons in 1946, in which year it accounted for almost a fifth of the production of mines of all kinds. Meanwhile the output of underground mines has fallen from 2.73 million tons in 1943 to 2.26 million tons in 1946. Over the twelve year period in which total output has expanded by 56 percent that of underground mines has been increased by only 11 percent. In the same period the output of coal per man employed underground has fallen from 629 tons to 593 tons. It touched a peak of 717 tons per underground worker early in the war, in 1942: in four years the figure has fallen by as much as 15 percent. While in underground mines the number of workers remains remarkably steady after an increase early in the war, the total production of coal and of coal per worker both reveal steep falls.

In these circumstances, and in view of the rapidly swelling demand for coal arising from a surge of new and enlarged industrial production, it is not surprising that in 1946 arrangements were made to bring coal all the way across the Pacific from Wyoming. Further shipments arrived in 1947 and the coal was landed at a cost very much in excess of the prices ruling for the New Zealand product. Now comes the announcement that the dominion is to take a share of the surplus, over and above domestic requirements, that for the first time for some years is available in the United Kingdom as a result of the very creditable achievement of the recently established National Coal Board and its employees. In view of the fact that there is as yet no indication that the dominion's coal mining industry has reached the maximum of efficiency or development, these unprecedented and costly importations should be continued no longer than is deemed absolutely imperative, for there are other demands for any such surplus that many would consider should have priority over New Zealand's need.

THE SOCIETY'S LIBRARY. The first issue of the *New Zealand Geographer* appeared in April 1945. For over three years the journal of the society has been penetrating further and further afield and has been welcomed everywhere. The series of exchanges originally instituted has been continually augmented so that now some twenty-five periodicals arrive regularly in the editorial offices from Britain, France, Austria, Poland, Sweden, Canada, the United States, India, Brazil, Argentina and Australia.

In addition, the society possesses a nucleus of books which have been received for review during the last three years. Although few in number these volumes cover a wide field, from university textbooks to literature of a more popular appeal. It has not been possible to compile a complete catalogue of this section of the library since a number of the books are still in the hands of the reviewers. The librarian would welcome their early return.

The ultimate object is to establish a collection of geographic literature which will be a basis of reference and research for members of the society. The library is housed meanwhile in the Department of Geography, Auckland University College, under the care of Mr. James W. Fox, B.A., who has been appointed librarian to the society.

The following is a list of the periodicals which are being received:
Acta Geographica, Annales de Géographie, Annales Universitatis Mariae Curie-Sklodowska (Lublin), *Australian Geographer, Bulletin de l'Association de Géographes Français, Canadian Geographical Journal, Economic Geography, Geografia* (University of Sao Paulo, Brazil), *Geographica* (Upsala University, Sweden), *Geographical Journal, Geographical Review, Geography, International Labour Review, Journal of Glaciology, Journal of the Elisha Mitchell Scientific Society, Journal of the Polynesian Society, Mitteilungen der Geographischen Gesellschaft* (Vienna), *New Zealand Journal of Forestry, Pacific Affairs, Pacific Science, Panjab Geographical Review, Queensland Geographical Journal, Revista do Instituto Geografico e Geologico* (Sao Paulo), *Scottish Geographical Magazine, Texas Geographic Magazine, United Empire, William and Mary Quarterly, World in Focus.*

AGRICULTURAL STATISTICS. The last two weeks of 1947 brought an abundance of data descriptive of New Zealand agriculture at the end of the war and in the years immediately following, for in the one week there was circulated the *Official Agricultural and Pastoral Statistics* for the years 1944-1945 and 1945-46, and hard on the heels of this valuable overdue volume there was issued, as a supplement to the *Abstract of Statistics* for December 1947, dominion totals for the principal items of agricultural and pastoral production for the year 1946-1947. Here we have in one week a statistical record of the dominion's first and foremost activity during three most interesting and crucial production seasons, and an answer to the many questions and doubts about the state of the primary industries in the very recent past. Unfortunately not all the answers are satisfactory. Perhaps the most unsatisfactory of all is the statement about the dominion wheat acreage during the three seasons and the estimated acreage for the season just concluded (1947-1948). It shows a progressive and marked decline: 1944-1945, 183,886 acres; 1945-1946, 161,049 acres; 1946-1947, 141,407 acres, and 1947-1948 (estimate) 122,000 acres. Acreage has diminished by no less than 60 percent since its wartime peak in 1942-1943. No matter how cheaply wheat is being secured from Australia, these figures suggest that, through depending to an increasing extent upon imported grain, New Zealanders are taking a thick slice of 'Britain's loaf'.

For the first time since 1930 data were collected in 1947 showing the number of persons 'engaged in farm work on holdings of one acre and over outside borough boundaries . . . . . (including) occupiers and those members of the occupier's family over school age . . . . . but (excluding) temporary workers . . . . . domestic servants or cooks . . .' The last two pages of the *Supplement* present the figures collected last year together with those for 1930, and form not the least interesting section of this statistical report. Not only geographers will find the following figures culled from the *Supplement* of considerable interest.

	1930	1947	Percentage increase or decrease.
Persons engaged on farms	138,121	124,386	−9.9
Number of farm holdings	85,167	86,483	+1.5
Total area cultivated (acres)	19,156,074	20,103,863	+4.9
Area under crops (acres)	1,283,947	1,147,469	−10.6
Area under sown grass (acres)	16,872,948	17,849,983	+5.8
Agricultural tractors	3,891	21,156	+443.7
Milking plants	20,415	32,596	+59.7
Shearing machines	7,394	14,564	+97.0

Equally interesting and instructive as a reflection of the regional development of the country and its farming are the following figures showing the changes, by land districts, in seventeen years of the male population engaged on farms:

	1930	1947	Percentage increase or decrease.
North Auckland	16,067	16,739	+4.2
Auckland	21,213	24,988	+17.8
Gisborne	3,905	4,048	+3.7
Hawkes Bay	7,517	7,678	+2.1
Taranaki	9,332	8,769	−6.0
Wellington	18,137	16,142	−11.0
Marlborough	2,586	2,274	−12.1
Nelson	3,568	3,281	−8.0
Westland	1,013	841	−17.0
Canterbury	17,354	14,037	−19.1
Otago	10,538	7,483	−29.0
Southland	8,091	6,641	−17.9
NORTH ISLAND	76,171	78,364	+2.9
SOUTH ISLAND	43,150	34,557	−19.9
DOMINION	119,321	112,921	−5.4

In view of the many arguments about the varying size of the farm labour force of the dominion in recent years it is a matter for regret that it has not been deemed advisable to collect data of the kind just quoted along with the census of agricultural and pastoral production in each of the intervening years. Farmers claim that the labour on farms has declined sharply in recent years. These figures would seem to support that claim. On the other hand the report of a parliamentary committee set up to investigate the future population needs of the country that was published in the *Appendices of the Journal of the House of Representatives* late in 1946 asserts that in the years 1936-1945 the farm labour force increased by 12,000 persons or no less than eight percent. Unless we are to believe that between 1930 and 1936 the number of persons engaged on farms declined by some 26,000 (or over twenty percent) the two sets of data are irreconcilable. Only by the regular annual collection of reliable and uniform statistics is it possible to measure accurately changes of fundamental importance to the economy of the dominion. Geographers will hope that it might be possible to include in all future issues of the *Agricultural and Pastoral Statistics* detailed county data descriptive of the number and distribution of the 'persons engaged on farms'.

IN OUR CONTEMPORARIES . . .

1. *In New Zealand Journals . . .*

INTERNATIONAL RESPONSIBILITIES IN THE PACIFIC

TRUSTEESHIP AND NEW ZEALAND'S PACIFIC DEPENDENCIES: E. Beaglehole, *Journal of the Polynesian Society*, Vol. 56, No. 2, 1947, pp. 128-157.

THE CANBERRA PROPOSALS FOR A SOUTH PACIFIC COMMISSION: C. G. R. McKay, *Ibid*, pp. 158-162.

THE ECONOMIC AND SOCIAL PROBLEMS OF THE PACIFIC: Ivor Thomas, *United Empire*, Vol. 38, No. 4, pp. 182-187.

Whether because of conscience or of interest, the Second World War, like the first, focussed new attention on attempts to translate into effective action good intentions towards the native peoples whose social structures have been subjected to the impact of the materially better-equipped and more changeful economies of western Europe. It has also, in the South Pacific, through the actual presence of bulldozers, jeeps, aeroplanes, freely-spending troops, as well as grim fighting in some parts, pushed the problem a stage further; while in the background is the new surge of nationalism in the more advanced colonial areas of southeast Asia. Hence the importance of the articles listed above.

Dr. Beaglehole's is much the most substantial. Though it is limited to New Zealand's responsibilities in Western Samoa and the Cook Islands, with the minor cases of the Tokelaus and Niue, it raises the issues that run right through the island area, however much they may be modified by local differences; and it includes realistic discussion of the South Pacific Commission, which is also the subject of the other two papers. Dr. Beaglehole's approach is tough and penetrating, and peculiarly free from the benevolent vagueness that vitiates so much of the discussion of this question.

Real ability 'to stand by themselves under the strenuous conditions of the modern world', as the League Covenant put it, requires, Dr. Beaglehole points out, ability to pay for the administrative services—government, education and health, for instance—that are necessary to world-participation. This in turn requires productive power adequate to make these payments above the subsistence economy that is still basic in most islands. In Western Samoa the public revenue more than meets existing administrative costs; but further development in selfgovernment would require expansion of services, notably education. The Cook Islands depend on a subsidy from New Zealand, amounting to not much short of half the total expenditure. In both cases the export surplus section of the economy, which is connected with the availability of revenue, is highly vulnerable. A fall in the price of copra, general world economic conditions, and the devastation of hurricanes are contingencies that must be provided for in good times. Dr. Beaglehole stresses 'the paramount need for a clear statement on the projected rate of social change' and the relation thereto of an educational policy adequate to its realisation.

Relevant to this is the attention he calls to the vagueness of the objectives in the Trusteeship Chapters of the United Nations Charter and the Trusteeship Agreement for Western Samoa. 'Whose judgment is to prevail in a conflict of opinion as to whether the territory is ready for selfgovernment or independence is left discreetly hidden in a veil of words.' The same applies to the work of the South Pacific Commission. The first of its major functions is 'to study, formulate and recommend measures for the development and coordination of the economic and social rights and welfare of the dependent peoples'. Have these peoples, asks Dr. Beaglehole, 'already received all their economic and social rights? What are their economic and social rights anyhow?' 'Whether the Commission is merely a benevolent modern disguise for old-fashioned colonialism or really represents the beginning of a new period of social development for island people will depend . . . . . . mainly on the intentions of the participating governments.'

Mr. McKay stresses the isolation and diversity among the island peoples. 'For many of them the world beyond the reefs which encircle their shores is still largely unknown'; and he notes that there was no native demand for the South Pacific Commission. He implies that such efforts are the product of a one-way benevolence. This, perhaps, takes too little account of discontents in Western Samoa and the Cook Islands, and such manifestations as the 'Marching Rule' in the Solomons. As Professor Firth mentioned in the Royal Empire Society's discussion, the stone age is retreating rapidly among the more backward peoples of the area.

Mr. Thomas, Parliamentary Undersecretary for the Colonies, may seem a little too complacent in claiming that 'the white man in the twentieth century is doing his best to wipe out the evils which, through misunderstanding and malevolence, the white man inflicted on islands in the nineteenth century'; and one suspects the attitude which peeps through the statement that in the Solomons 'such a large proportion of the native population is engaged on subsistence cultivation, hunting and fishing, that the available labour force is reckoned at only 5,000-6,000.' This sounds rather like 'old-fashioned colonialism.'—Willis Airey.

Technology and New Zealand Agriculture

FARMING IN NEW ZEALAND: REFRIGERATION: B. E. King, *N.Z. Journal of Agriculture*, Vol. 74, No. 6, June 1947, pp. 565-576.

FARMING IN NEW ZEALAND: TOPDRESSING: J. M. Miller, *New Zealand Journal of Agriculture*, Vol. 75, No. 1, July 1947, pp. 19-32.

FARMING IN NEW ZEALAND: MEAT, WOOL AND DAIRY PRODUCE: P. W. Smallfield, *New Zealand Journal of Agriculture*, Vol. 75, No. 2, August 1947, pp. 167-176, and *ibid*, Vol. 75, No. 3, September 1947, pp. 265-277.

Previous articles in this series have brought the history of New Zealand agriculture up to 1880.

Mr. B. E. King describes the development of the meat and dairy export industries during the period 1880-1900, probably the most important epoch in our history, for refrigeration brought promise of renewed prosperity to farming and finally decided our major occupation, and a few far-seeing men promoted closer settlement and showed the way to meat and dairy production based on intensively-managed grassland.

Full credit is given to Thomas Brydone of the New Zealand and Australian Land Company, his experiments with dairying and liming at Edendale and his work with Davidson in sending the first cargo of frozen mutton to London in 1882, followed later by cargoes of butter and cheese. Mr. King traces the changes in breeding and farm management consequent upon the growing demand for lamb on the English market. So came the breeding of half breds which were later crossed with the Leicesters for fat lamb production. The fattening of sheep and lambs for export required the growing of large areas of rape and turnips, and gradually sheep farming separated into two divisions: store sheep farmers on the hilly and poor land supplying breeding ewes to the fat lamb farmers on more fertile land. Fodder crop production made possible the introduction of fertility-building rotations—the days of 'bonanza' wheat farming were over.

By 1900 the dairy industry was soundly established and (with the continued expansion of the meat export industry) brought success and prosperity to the small farmer. The present day pattern of land use in New Zealand was rapidly taking shape.

The second article shows how, while one group of men was working on refrigerated transport foodstuffs, another group was independently working out the cheapest means of producing those foodstuffs—the grazing of topdressed pasture. The history of topdressing in New Zealand is the history of Waikato farming, for it was there that farmers were forced into intensive grassland farming with the aid of topdressing, on soils which would not naturally carry milk-producing pastures. As Mr. Miller says: 'the Cambridge settlers developed topdressing partly because they had heard of the Rothamsted experiments, but mainly because they had to.' The author shows how the experiments conducted by the Cambridge Farmers' Club, in the space of seven years, really determined the future of the Waikato, and subsequently the future of many other parts of New Zealand. They developed a system of farming based on permanent pasture grown from reliable seeds, maintained by suitable topdressing and converted into dairy products, pigs and fat lambs.

It was not until 1904 that the Department of Agriculture began its now-famous topdressing trials at Ruakura and not until after 1908 that farmers outside the Waikato began to show interest. Their early adoption of widespread topdressing gave the Waikato farmers a tremendous economic advantage over their competitors in Taranaki, Manawatu and Southland and eventually forced them to adopt it in spite of their scepticism.

Mr. P. W. Smallfield's two articles trace the progressive expansion of the dairy, meat and wool industries between 1900 and 1920. With the advent of dairying it was possible for the state to proceed confidently with the closer settlement of the North Island. 'Thousands of farmers who had struggled for years at a subsistence level on small farms and who had previously depended for a living on gumdigging, fungus picking or casual work in the timber or phormium industries set about gathering together a small herd of cows with the prospect of securing a regular cash income from their farms.' It is a story of the magic of topdressing in increasing production, of the improvement of milking sheds, of the introduction of the milking machine, of improved methods of handling milk and cream developed by the officers of the Department of Agriculture.

While the dairy industry was being developed, leasehold tenures and state advances to settlers enabled thousands with small capital to commence sheep farming on the bush burns of the middle western areas of the North Island. 'A few hundred pounds and a bushman's outfit of tent, axes, saws, and wedges were sufficient assets to secure a leasehold Crown section.' It was a time of hardship for men, women and children. Mud was their enemy and isolation was often a mental as well as a physical hardship. 'It was essentially a period of bad farm houses and good fences.' But it was a period in which the foundations of intensive grass farming were laid and that, of course, means the foundations of our present prosperity.—L. W. McCaskill.

Canterbury Farming

FARMING IN NEW ZEALAND: THE CANTERBURY DISTRICT: R. P. Connell, *N.Z. Journal of Agriculture*, Vol. 75, No. 4, October 1947, pp. 369-384, and *ibid*, Vol. 75, No. 5, November 1947, pp. 465-475.

The description of agricultural production according to provincial districts has been continued. Natural conditions made Canterbury an inviting land to the pioneer farmer. The tussock grassland provided nutritive grazing for the pastoralist and large areas on the plains and downland were suited to immediate arable farming. In addition here was a climate suitable for the maintenance of health and vigour in men, animals and crops. The farmers of Canterbury have had a good record of initiative, imagination, effort, ability and achievement particularly in arable farming. Of the 1,250,000 acres normally in arable crops in New Zealand, approximately half is found in Canterbury. This includes four-fifths of the wheat, more than half the potatoes, about three-fifths of the peas, half the oats and three-fifths of the barley, as well as onions, mustard, linseed and linen flax and large areas of fodder crops such as rape, turnips, kale and green feed. Canterbury is also the main producer of grass and clover seed for export and for sowing elsewhere in New Zealand.

Nevertheless Mr. Connell does well to stress that arable cropping is far from having a dominating position in Canterbury even in the arable farming belt. Under modern practice land there is generally spelled under grass for nine years in a twelve years' cycle. Recent tendencies have been the sowing of certified strains of grasses and clovers and topdressing them with lime and phosphate. This has made possible the carrying of more stock and the fattening of more lambs. The resulting increase in fertility produces higher yields of cash crops when the pastures are broken up. Mr. Connell contends that a further substantial expansion in economic farm production in Canterbury is possible by increased use of phosphatic topdressing associated with liming on high quality swards. He advocates the wider use of lucerne for hay for winter feed, and extension in the use of subterranean clover on the light plains land and looks to irrigation as an important factor in increasing production. It is usual to overlook the fact that the 2,320,000 acres of unoccupied barren and unproductive land in the backcountry of Canterbury is a real asset as a reservoir of water for electric power, farm water supply and irrigation.

These two articles abound with useful and interesting pieces of information. 'The area in tussocks and other native grasses forms more than half of the occupied land' . . . . . 'Although Canterbury has 23 percent of the unimproved land of the dominion, it has only 4 percent of the fern, scrub and secondary growth.' 'There are less than 100 flocks of more than 5,000 sheep and only five flocks of more than 20,000 sheep.' 'The tonnage of lime delivered at Canterbury railway stations rose from 16,000 in 1935 to 109,000 in 1945.' 'The number of small holdings within 25 miles of Christchurch is probably about 3,000.' 'One third of the dominion's large poultry flocks (1,000 birds and over) are in Canterbury.'

Numerous photographs and a map of 'land utilisation' accompany the articles.
—L. W. McCaskill.

Studies in Farm Management

This series of articles with this general title continues to appear in the *New Zealand Journal of Agriculture* although publication has now become very irregular.

A South Otago Mixed Farm. This farm of 1,020 acres, originally a portion of the old Clydevale Estate, is in the centre of what is usually termed the browntop area of South Otago. In its native state it carried silver and red tussock most of which was put under the plough in the early days. It is difficult country to farm, and without proper treatment pastures revert rapidly to a turf of browntop so dense that the tussock is unable to re-establish itself. While producing very little feed for stock, browntop has the saving grace of being in demand for lawns and playing fields. But the production of browntop seed contributes little to the food supply of a hungry world, and the owner of this farm has shown how this land can produce large quantities of human food in the form of wheat, oats and sheep. It is a story of drainage, especially mole drainage, of sowing down on carefully prepared seedbeds of persistent strains of good grasses and clovers; and of a regular policy of topdressing with lime and superphosphate. Pastures rarely stay down more than seven to nine years, the plough-up being followed by the taking of three or four crops before pasture is sown down again. The article demonstrates clearly the potentialities of this rolling country if capital, brains and energy can be harnessed together.—L. W. McCaskill.

Geomorphology for Motorists

SOME NEW ZEALAND LANDSCAPES: G. Jobberns, *New Zealand Motor World*, Vol. 12, No. 5, July, 1947 (and subsequent issues), pp. 15-17.

In the *New Zealand Motor World* of July 11, 1947, Dr. G. Jobberns commenced another series of his pleasantly written sketches of roadside scenery, embodying caricatures of the geomorphology. In this first article he dealt with a North Island district, and described the Wairarapa route to Napier, with a digression on the Manawatu gorge. For the most part he treats more modern explanations of the origin of major landscape forms with some suspicion and suggests a return to the views of F. W. Hutton and his contemporaries in the seventies of last century on the later geological history of New Zealand.—C. A. Cotton.

2. *In Overseas Journals . . .*

Where Angels Fear to Tread

THE PULSE OF THE PACIFIC (Clarke Memorial Lecture): L. A. Cotton, *Proceedings Royal Society of New South Wales*, Vol. 80, No. 1, 1947, pp. 41-76.

Professor L. A. Cotton, of Sydney, has published an analysis of strand lines around the Pacific basin. This is a painstaking attempt to establish order out of chaos; but the results merely show how almost any such thesis can be presented plausibly with the aid of well-selected statistics. In reality but one fact emerges from such studies, namely that many Pacific coasts, and in particular those on the unstable rim of the basin, are terraced. The work of Putnam, W. H. Hobbs, and others leaves little doubt that many of the terraces mark strand lines, but even this elementary proposition has been questioned by Douglas Johnson. (It may be noted that the important papers by Hobbs and Johnson just referred to are not cited in the author's bibliography.) Not only has Johnson questioned the authenticity of many 'marine' terraces, but he has also wisely insisted on extreme caution in accepting (in the case of genuine examples) the very numerous statements to be found in print attributing strand lines to certain levels because of the discovery of terraces on various parts of which, some far below the strand lines at the time the terrace was cut or built, altitudes have been measured. Not all observers have been as careful as King was at Wellington in measuring the altitudes only of ancient beaches at the rear of marine terraces.

Even if this precaution were taken, it would be possible—because of the endwise tilting of terraces in New Zealand and California, and no doubt at a thousand other places on the Pacific rim—to select altitudes that would prove the existence of raised strands at every level, foot by foot, from the present sea level to 1,500 feet or more above it. Nevertheless the conclusion is naively stated that 'there is a striking degree of correspondence [of ancient sea levels] extending over large areas,' and the conclusion is supported by tables.

It is obvious that records from the unstable writhing sections of the rim regions should have been excluded; but this would have left little for tabulation beyond what has been already done by Stearns for certain island groups built on the more stable central Pacific floor.

In view of the fact, clearly pointed out by Hobbs in the work already referred to, that the Mariana arc is part of the unstable rim, while the Caroline Islands stand on the stable basin floor, it is unfortunate that the author has lumped together the statistics from these two groups.

Almost all the New Zealand data, to which the author has devoted several pages, are taken from a paper by Jobberns published in 1928, but the author is evidently unaware that Jobberns has since reversed his opinion even as to the marine origin of most if not all of the terraces he has described. Though his recantation has not yet been published in full, it is still eagerly awaited by New Zealand geomorphologists. His revised views were strongly supported by Douglas Johnson, whose posthumous paper (1944) has been referred to above.—C. A. COTTON.

PROBLEMS OF URBAN AND RURAL PLANNING IN GREAT BRITAIN

INSTITUTE OF BRITISH GEOGRAPHERS PUBLICATION No. 11: TRANSACTIONS AND PAPERS, 1946.

It is a source of very considerable pleasure to record the reappearance of the *Publications of the Institute of British Geographers* after a lapse of some years, and heartening to find that, wartime duties completed, geographers in Britain are again able and prepared to face problems of peace and to renew their contributions to the solution of such problems. *Publication No.* 11 is an admirable start.

1. Some Geographical Aspects of the Greater London Regional Plan. S. W. Wooldridge, D.Sc., F.G.S.

At a time when all kinds of plans are being prepared for development of urban areas it is extremely valuable to have the advice and assistance of 'experts' before the final details of the plan are put into effect. Constructive criticism may also be of value once the plan has been announced. Dr. Wooldridge in this paper has clearly indicated important weaknesses in the Plan for Greater London from the viewpoint of a geographer, and it is to be hoped that his criticism will not pass unheeded.

One of the chief weaknesses of the plan from the writer's point of view is the lack of a preliminary regional survey 'providing the frame and background to the immediately practical problems . . . . . Planning and conservation demand thorough preliminary stocktaking of resources both economic and aesthetic. Without such stocktaking it inevitably limps on one leg and its proposals are subtly falsified.' This is as important advice for the regional plans for the cities of New Zealand as it is for the plan for London.

Another major fault in the London Plan is in the limitations set by its boundaries. The area treated is far too small, and it is here that the approach of a geographer with a broad regional viewpoint is extremely valuable. All the Weald, for example, should be included in the plan. 'The disruption of the Wealden area can be justified on no grounds whatsoever, aside from administration convenience . . . . . To leave Sussex as an area for independent planning, lying as it does in relation to the economic life of the country as a whole, in the lee of London, is to condemn ourselves to complete frustration and chaos in planning.' These are harsh words, but they serve as an expert's warning for the future. As the plan stands it is possible to overload the outer parts of the London region with both satellite urban areas and industrial establishments which would only transfer the problem from an area of early settlement to its periphery.

A warning is also given about the availability of water to the proposed satellite towns, especially those of Crowhurst and Holmwood in the Weald. 'It is not as widely realised as it should be that, as contended in recent years by leading consulting geologists, the absolute population ceiling in any region is set by the availability of water', but little heed has been taken of such advice by those responsible for the Plan of London.

After pointing out serious discrepancies on the land classification map used in the plan, the writer suggests a physical basis of regional classification 'which may better serve as a background to the London Plan'. This is worth careful study, as it helps to make up for the serious lack of a basic regional survey on which a plan for the Greater London region should be based.

2. The Distribution of the Rural Population of Great Britain. A. Stevens, M.A., B.Sc.

By means of a statistical analysis of the census figures for 1931 Mr. Stevens has examined the population pattern of Great Britain. His working hypothesis for the study is expressed in the concluding paragraphs: 'the equilibrium attained by a stable community with its available resources so far as they are dependent on productivity of the region the community occupies, should express itself in a normal of rural population density . . . . This normal must be related to technical efficiency and to living standards, and will change with these until ultimate population saturation has been achieved.' An interesting distinction is made between 'primary' and 'secondary' rural populations, the former engaged in actual production from the land, and the latter partly ancillary to the exploitation of the land and partly contributory to the welfare of the community. The secondary rural population is therefore regarded as a burden carried on the shoulders of the primary population, and when the relationship between the two is expressed as a ratio it is possible to use it as a standard for purposes of comparing population densities of different regions.

Quite apart from the value of the paper as an indication of the rural population in Great Britain the unusual mathematical approach is in itself a useful lead for further studies of the same kind. Care has been taken to point out invalid assumptions and meaningless phrases so often found in studies on population problems, and for this alone the paper should be of interest to geographers and economists alike.

3. The Growth of Bristol. S. J. Jones, M.A.

Mr. Jones has emphasised the regional aspects of Bristol's development from the very early period up to the present time. 'Bristol has been constantly expanding; sometimes to utilise potentialities in the local physical environment, sometimes in response to outside stimuli'. The reasons for this expansion have been different in the three distinct phases of its history, but the port seems to have always been the focus of commercial and industrial development. In the early days 'the mud banks of the Avon and of the Frome provided an adequate natural harbour; in the early nineteenth century the strain on old resources was lessened by converting portions of the Avon and of the Frome into a floating harbour; in the late nineteenth century it was necessary to build new docks at the mouth of the Avon. Thus, in the late nineteenth century a considerable extension of the regional basis of the city was necessary, and Bristol had ultimately to acquire a long corridor of land to link it adequately with its outport at Avonmouth'.

For each of the above phases in the history of the city the writer has examined the economic basis of the growth that took place. Emphasis has been placed on the inter-relationship between social influences and morphology to bring into true perspective the 'function of the social organisations and institutions of which the buildings are just the bare skeletons'. The importance of social momentum is not overlooked; in fact it was due to the maintenance of an eighteenth century outlook in the critical opening years of the nineteenth century—an 'outlook which had no place for changed economic pattern and the rise of new rivals, that did much to jeopardise Bristol's position in the present-day world.'

The paper is well illustrated with maps and plans of the city for each period of its growth, and makes many references to important historical documents.

4. The Urban Mesh of England and Wales. A. E. Smailes, M.A.

In the fourth of this series of papers there is nothing new in the discussion of the population patterns that have existed at different times in the history of the country. The conclusions are similar to those stated in many previous articles and reports on the subject. The urban distribution today expresses with modifications the pattern of the nineteenth century, when the determining factors were the location of minerals, especially coal and iron ores, the location of port facilities, and the development of the railway network across the country. The main changes that have taken place in this pattern have been the shift of industry to fresh sources of ironstone, as well as the shift to the coastal areas suitably located for the importing of raw material, and the exporting of the finished manufactured goods.

The most interesting part of the paper is the section discussing the accessibility of urban services, and it is here that the writer applies the theory of the German scholar, Christaller, to the population of England and Wales. The essence of Christaller's theory is that 'a certain amount of productive land supports an urban centre. The centre exists because essential services must be performed for the surrounding land'. But as Mr. Smailes points out such a theory ignores or undervalues too many factors of importance in urban development to be generally applicable. Many towns of England for example supply urban services for their own residents and only incidentally do they serve inhabitants of surrounding districts.

There are two maps to illustrate the arguments of the paper, the first shows the urban hierarchy with the pattern of the 'hour glass' indicating the area of maximum urban concentration. The second map indicates the accessibility of urban services. The lines of equal access to a central service are not symmetrical rings but irregular figures, the outermost points of which are along main roads. Outliers occur in the vicinity of railway stations. Through the modern development of rapid communications a large percentage of the people of England and Wales live within effective range of the manifold services available in metropolitan centres. 'Urban functions tend to be cumulative in their development and the power of the greater cities strengthens at the expense of their lesser brethren.' It is on account of this recent tendency towards a concentration of services in a few large metropolitan centres that this paper should be closely studied by all concerned with town-planning in the postwar period.

—GRAHAM H. LAWTON.

NEW ZEALAND TIME

In a note on New Zealand time published in Volume 3, Number 2 of the *New Zealand Geographer*, Mr. L. P. Lee stated that it would appear that the idea of daylight saving was first mooted in Britain about 1907. Overseas publications had led him to believe that this in fact was the first appearance of the idea. Mr. Lee has however since learned that it is much older, and that New Zealand can apparently claim to be the country in which the proposal was first made. The late Mr. G. V. Hudson made the suggestion at least as early as 1895, and contributed a paper 'On Seasonal Time' to the *Transactions of the New Zealand Institute*, Vol. 31, 1898, pp. 577-583 in which the idea is discussed.

REVIEWS

THE PACIFIC DOMINIONS

AUSTRALIA: ITS RESOURCES AND DEVELOPMENT. Edited by G. L. Wood. New York: The Macmillan Company, 1947, pp. 334.

NEW ZEALAND. Edited by Horace Belshaw. Berkeley and Los Angeles: University of California Press, 1947, pp. 329.

These two books make a useful contribution to the literature descriptive of Australia and New Zealand. Both are collections of essays written by a wide variety of specialists, each eminent in his own field, so that the information assembled may be accepted as authoritative. To give such a book cohesion and continuity is a difficult job for the editor, in each case a distinguished economist; to review it adequately is almost as difficult.

The Australian book, edited by G. L. Wood, Professor of Commerce in the University of Melbourne, is evidently designed to give American readers a compact account of Australian economy, society, resources and achievement. The editor himself is responsible for two chapters, the other nineteen being contributed by a panel of specialists in various fields. Each chapter is necessarily a brief essay in itself, more or less selfcontained. Without exception these essays are very well done, some being models of lucid condensation. Nevertheless the student of geography looking for a descriptive account of the Australian countryside in all its variety will be disappointed, though he will find useful, neat summaries covering most of the main elements of the environment and economy. Of some more special interest to the geographer is a final chapter by John Andrews of the University of Sydney who states briefly but bluntly why Australia must look to taking a bigger share in the affairs of the Pacific world.

The New Zealand book is edited by Horace Belshaw, now Professor of Agricultural Economics in the University of California. It is one of the United Nations series, under the general editorship of Professor Robert J. Kernes (in which series a volume of Australia is promised and is to be edited by C. Hartley Grattan). This book attempts to picture New Zealand in its economic, social and political aspects. It is divided into four parts dealing respectively with the background, economic and social development, cultural development, and government and foreign policy. The panel of contributors includes J. C. Beaglehole ('Discovery and Exploration' and 'International and Commonwealth Relations'); Andrew H. Clark ('Geography'); I. L. G. Sutherland ('Maori and Pakeha'); W. T. G. Airey ('New Zealand in Evolution'); H. Belshaw ('Economic Organisation'); W. M. Hamilton ('Farming Industries'); S. Leatham ('Industry and Industrial Policy'); D. W. Oxnam ('Labour Legislation and Organisation'); W. B. Sutch ('Social Legislation'); A. E. Campbell ('Education'); A. R. D. Fairburn ('Literature and the Arts') and L. C. Webb ('Politics and Administration').

That it all hangs together as well as it does is a tribute to the editorial organisation. Nevertheless, the geographer will look in vain for a satisfying descriptive picture of the contemporary scene, either rural or urban. Clark's geographic contribution is satisfactory enough as far as it goes, but like all the other contributions it is but an individual essay suffering from the necessity for vigorous condensation. The infinite variety of countryside which is the chief charm and attraction of New Zealand is not vividly portrayed. Yet the serious student of geography should find something of interest and stimulus in the book. Sutherland's sympathetic essay on the Maori people, Hamilton's solid account of the role of farming in the economy, Belshaw's brief summary of economic organisation and Beaglehole's final chapter on 'International and Commonwealth Relations' should be of value to him.

Overall this is a substantial book. It is not uniformly easy to read, but this is inevitable in such a collection of essays. Every reader will find in it something that will appeal to his own personal interest or taste.—G. JOBBERNS.

New Zealand History

NO ROLL OF DRUMS. By C. B. Brereton. Wellington: A. H. and A. W. Reed, 1947, 176 pp.

HOW THE MAORIS CAME TO AOTEAROA. By H. D. B. Dansey. Wellington: A. H. and A. W. Reed, 1947, 110 pp.

The time has passed when New Zealanders could complain of the general standard of local book publishing. During the past ten years, assisted to some extent by wartime shortages of overseas volumes, New Zealand publishing has made great strides. Today the best specimens of bookmaking in this country compare favourably with those from much older and larger countries.

Both the books discussed here are produced by A. H. and A. W. Reed, a firm which is doing valuable work in popularising New Zealand history and geography, and thus awakening the pride and interest of the ordinary reader in his country and in his heritage. The volumes are well printed and illustrated, with attractive dust jackets, and altogether fulfil the requirements of a workmanlike job.

Colonel Brereton's *No Roll of Drums* is as interesting a piece of work as I have encountered recently. 1947 saw the production of several excellent pioneering memoirs, notably W. K. Howitt's *A Pioneer Looks Back Again*. The pioneers are fast passing away, and it is well that they and their sons should record the birth pangs of New Zealand before it is too late. Their accounts not only form an important historical record but are a constant reminder to a flabbier and more slothful generation that the foundations of the prosperity they enjoy in a country so blessed with material goods were laid by a vigorous, hard-working and God-fearing ancestry.

Colonel Brereton's book is a bracing and readable account of the founding and development of the Ngatimoti district of Nelson and the history of the settlers on the banks of the Motueka River from 1853, when J. B. Salisbury built the first home at Pokororo. In his pages, no musty skeleton of history rattles, but there breathes the very life of the people who shaped a prosperous settlement from the wilderness. The first two chapters, with their details of family history, are somewhat heavy going, but after that the narrative quickens, and, lively with anecdotes and character sketches, the exciting story of pioneering trials and triumphs bustles along. The author, born in 1876, is a son of one of the earliest settlers in the district, and as a boy, he lived the full life of a pioneer. His book, based upon diaries, letters and his own recollections, is warm with nostalgia and sharp with vividly-remembered details. He has a rare gift for capturing the essentials of a scene or a situation: pity, humour and humanity give force and interest to an animated set of memoirs.

Particularly impressive is his account of the great flood of 1877, when the swollen Motueka all but destroyed settlement and settlers. Noteworthy, too, are descriptions of the huge bush fire of 1897, of the building of the canoe Taeroa by a Maori craftsman; (for Maori canoes were the settlers' only means of transport), of the discovery of the tableland between Mt. Arthur and Mt. Peel, of cattle mustering in the heavily-bushed country of the Lockett Range. The pioneering type is represented by many colourful characters, as rich and as satisfying as in any novel—the author's father, Barty Lloyd, John McGaveston and such tableland hermits as the independent Billy Lyons.

No Roll of Drums might be the story of any part of New Zealand, and as a graphic recreation of the rigorous shaping of a new land, it can be strongly recommended.

Mr. Dansey's *How the Maoris Came to Aotearoa* takes the reader back many hundreds of years beyond the period of which Colonel Brereton writes. The story he tells has been told several times before, by Sir Peter Buck, Elsdon Best, A. W. Reed and others, but it remains as fresh as ever, and few, if any, have told it so simply as Mr. Dansey. The great Maori voyages and the settlement of Aotearoa form one of the epic tales of the world, which still awaits a poet of genius to clothe it in fitting language as Homer did with the wanderings of Ulysses and Camoes with the discoveries of Vasco da Gama.

In the 10th and 12th centuries, Kupe and Ngahue, Toi and Whatonga, and Mania, ventured in open canoes from their home in Hawaiki, over thousands of miles of ocean, guided only by the stars, to find, and point the way to, this new fair land at the end of the world. In simple, unpretentious prose, with an admirable blending of fact and legend, Mr. Dansey retells the tale of the early explorations, through the story of each great canoe, the Te Hawai, the Tokomaru, the Aotea, the Arawa, and the rest, and including the 'Great Migration' in 1350. It is an inspiring and a charming narrative, the appeal of which is enhanced by the, at times, almost ingenuous directness of the telling.

Apart from the attraction of the story itself and the fact that no such concise account of the Maori voyages has been published before, the book has an added interest in the illustrations, some fifty of them, which the author has drawn for it. Also included are useful diagrams showing the construction of the early canoes, two maps showing the localities settled by the descendants of 'the Canoes', a comprehensive bibliography, and philological notes. *How the Maoris Came to Aotearoa* will be of interest to the ordinary reader rather than to the specialist, and is recommended particularly for school libraries, where it should prove a good deal more popular than more scholarly works on the same subject.—J. C. Reid.

A Popular Review and Travelogue

NEW ZEALAND AFTER FIVE WARS. By A. J. Harrop. London: Jarrolds, 1947.

Dr. Harrop's aim is 'to give a picture of New Zealand's achievements in war and peace against an historical background.' In pursuit of this laudable ambition he covers a great deal of ground, but he does so neither wisely nor well. The book opens with a dullish description of a journey from London to New Zealand via the United States and Mexico. The dullness is due to the attempt to say so much so briefly, and this is the essential weakness of the rest of the volume. There follows a neat transition in which the author remembers his West Coast childhood and leads us, a little self-consciously, into New Zealand history, via his schoolroom. The summary of nineteenth century developments is interesting and often racy, as in his narrative of the Maori Wars, but it is not original. Some sixty pages bring us to 1900 where a consideration of the first World War and its aftermath takes us to the body of the book which consists of an analysis of New Zealand's part in the recent war and some comment on New Zealand today. He concludes with a travelogue in which he visits Milford Sound, Rotorua, Auckland, and departs from the antipodes.

From the historical point of view the background chapters have the defect of any brief survey of a broad topic for brevity is seldom compatible with subtlety. So much is attempted that very little is dealt with adequately. The relations between Grey and Fox, the so-called £70,000,000 loan scheme of Ward, the scope and effects of the last slump, for example, are disposed of in too cursory a fashion for anyone seeking more than a statement of facts. Dr. Harrop deserves praise, however, for his range of information and his ability as a writer of precis.

The larger section devoted to New Zealand achievement in the recent war again reveals an admirable breadth of view and a wide examination of source materials, but again the general effect is one of superficiality. It is a kind of preliminary survey of the ground to be covered by the unwritten war history. But although it is short it is by no means concise, for it consists largely of strings of quotations from speeches, books, newspapers and, most horribly, from several pages from a report of the Director of National Service. This tendency to quote rather than to analyse, which was noticeable in Dr. Harrop's earlier and better books, has been eradicated in his chapters on the nineteenth century. At worst this discussion of the second World War descends to rhetoric and journalese.

A little less of documents and a little more of the author's opinions would have been welcome. Dr. Harrop is generous with the fruits of all minds but his own. This book does a disservice to his reputation. The aim is too encyclopaedic. In a final flurry he writes 'chapters' on education, sport, news services, the Maori renaissance, social security, with the result that 'Writers and Artists' becomes an unenlightening list of names and a quotation, given without comment, from Curnow's *Landfall in Unknown Seas*. The book is in fact a pot-pourri. To a foreigner it would convey many facts and little understanding. To a New Zealander it is unsatisfying and often irritating. For the layman there is too much fact and quotation for easy digestion. It is likely to be neither popular nor of value to scholars. It seems to serve no need unless it be that of a short war history to be bought rather than read.—KEITH SINCLAIR.

EARLY MAPS OF SOUTHERN NEW ZEALAND

THE MAPPING OF OTAGO. Dunedin: published for circulation among members by the New Zealand Geographical Society, Otago Branch, 1947, pp. 27.

A good deal of research must have gone into the compilation of this little booklet, which presents in concentrated form the work of a committee appointed to draw up a list of the important maps of Otago. It is duplicated from typescript, and typewriter limitations are noticeable in the rather untidy chronological table, but it is clear from the foreword that the booklet is merely a first draft, intended as 'a basis for that wider treatment which the subject deserves.'

It begins with a historical note on surveying and mapmaking. A captious critic could find fault with a number of inaccuracies in the information presented; but, as the booklet is not intended for general distribution, there would be no point in enlarging upon these here. The historical sketch of the mapping of southern New Zealand is both interesting and informative, although it is of necessity very brief. This is followed by a list of early field books in the Lands and Survey Department offices in Dunedin and Invercargill, with brief indications of their contents, and notes on some of the more interesting books containing sketches or other material which those acquainted with modern field books would not expect. The last and most important section is an annotated list of early maps of southern New Zealand, giving also the libraries where they are to be found.

The booklet would be valuable if it contained only the list of early maps, but it is to be hoped that it will ultimately be followed by a more comprehensive treatment, available to a wider public, and that it may stimulate other branches of the Society to take a similar interest in the mapping of their districts.—L. P. Lee.

English Counties

ENGLISH COUNTY: A PLANNING SURVEY OF HEREFORDSHIRE. A Publication of the West Midland Group on Post-War Reconstruction and Planning. London: Faber and Faber Limited, 1946, pp. 266.

DEVON AND CORNWALL: A PRELIMINARY SURVEY. A Report issued by the Survey Committee of the University College of the South-West, Exeter. Exeter: Wheaton and Co. Ltd., 1947, pp. 318.

During the early years of the war the Scott, Barlow and Uthwatt Royal Commissions focussed attention upon the vital problems of the land of Britain and its future. From the visionary pleading of a few enthusiasts during the 1920's and early 1930's there has developed in Britain a national interest in planning projects, and the coming to power in 1945 of a government pledged to effective national planning has made it vital for those responsible for formulating official policy, local and national, to be well supplied with essential data in a form suitable both for the expert and for the public whose enlightened opinion forms his main support. That is the reason for these books.

Appraisal of local and national resources is within the province of the geographer, who by his training is well fitted to take the lead in collecting and synthesising data concerning those many aspects of local activities embraced by the field of regional and national planning. These two volumes are attempts by groups of research workers to produce such basic studies of their areas, and both groups include members of the geography staffs of British universities on their fulltime staffs of investigators.

English County is the more ambitious, comprehensive and detailed work. It was produced after two years of fieldwork and much subsequent research. Its approach, technique of investigation, and method of presentation might usefully be applied to wider fields. Its interest to New Zealanders will be as much on this score as in its detailed analysis of the county of Herefordshire, which is almost entirely agricultural. It was selected for initial study because its problems are relatively simple. Further studies of the neighbouring counties, including the Birmingham industrial area, are to follow; the whole region will then include almost all the problems facing local, regional, and national planners in Britain today. The success of this first work makes it a pleasure to anticipate the further contributions promised by the group.

The first chapters portray the county in its geographic setting, its climate, natural resources and cultural development of landscape. Like all subsequent sections, it is brilliantly illustrated by original, fully-coloured maps and by photographs whose value is in this case amplified by annotated panoramic sketches. The maps and diagrams throughout are intended to provide information in themselves, and are by no means merely illustrating the text. Well-balanced sections on the 'People', (with detailed examination of Hereford's position since 1871 as a steadily decreasing county population), 'Economic Life', 'Social Environment and Public Services' follow. Agriculture claims almost 30 percent of the employed population, and manufacturing a little over 15 percent. A survey of the changes in occupation groups during the 1930's and the war years reveals that Hereford supported some new dispersed war industry and probably reversed its trend of steadily losing population from the rural areas. Interesting maps of demographic change demonstrate distribution and trends. Urban studies are pursued in detail; the country market towns are mapped on a large scale to show land classification and development, and a further series of maps illustrates housing, revealing that over 50 percent of the houses in most cases should be scheduled for replacement by modern standards.

A final chapter on local recommendations is an important contribution: Hereford can best contribute to the national economy by remaining predominantly agricultural, though the present position of its long-famed beef cattle and fruit production is far from satisfactory, and requires more scientific attention to pasture production as well as the planned replacement of the considerable proportion of worn-out orchards. Size of market towns should be increased, in order to support an improved standard of amenities, by the encouragement of light industry, and much needs to be done to provide necessary improvements in public services if the drift from rural life is not to be renewed.

The second volume, as its title suggests, has not the breadth of the Hereford enquiry, and consists rather of several major lines of investigation: 'Population', 'Fisheries', 'Industry and Trade', supported by shorter sections on 'Geological Structure and Scenery', 'Climate', and 'Agriculture'; nor does the book include such a wealth of mapped information, although its few maps are well-prepared.

The areas of sparse population in Devon and Cornwall are extensive, and the interwar years saw the position deteriorating, even in parishes favourable to scientific and intensive agriculture, and becoming most acute where the development of tourist and residential industries contributes little to the wellbeing of the villages and small towns. Fishing, long an important occupation in the southwestern peninsula, is also not being maintained by sufficient young recruits, and a highly desirable element in the population seems in danger of gradual extinction. The authors call for a bold policy to embrace agricultural planning, better housing for rural areas, with light industry to arrest the economic trend of activities from inland to seaside areas, and the provision of essential services long accepted as part of the normal facilities of urban life.

Both surveys make it plain firstly that 'the metabolism of the whole social organism is severely disturbed' in such less industrial counties of Britain and increasingly impoverished communities will result if the interwar trends are again allowed to resume their course; secondly it is vital to survey the entire field of social activities in relation to natural resources and industrial location in order to provide a sound basis for national plans. It is now generally accepted that only such planning can deal with the major problems of economic life, and political opposition is likely to take the form of ensuring that plans are wisely conceived and soundly supported in fact. Geographers have a major contribution to make in providing the bases of planning, and such examples as these should inspire the production of others. A copy of *English County* should be available not only on university shelves, but in every school and local library, for it offers an indication of the value of the geographic approach to contemporary problems.—R. G. LISTER.

CONTRIBUTIONS TO THE HISTORY OF EXPLORATION

RICHARD HAKLUYT AND HIS SUCCESSORS: A volume issued to commemorate the Centenary of the Hakluyt Society. Ed. E. Lynam. London: The Hakluyt Society, 1946, pp. 192.

This volume, unlike the normal annual volumes of the Hakluyt Society, is not composed of original documents; but it should not on that account be neglected by students. The most important contribution to knowledge is the essay by Messrs. Crone and Skelton on English collections of voyages and travels from the appearance of *Hakluytus Posthumus or Purchas His Pilgrimes* in 1625 to the foundation of the Hakluyt Society in 1846. This useful piece of bibliographical work brings to light many half-forgotten collections besides the well-known works of Hawkesworth, Burney and Pinkerton. The information about the important early eighteenth century collections of Churchill, Harris and Campbell, and Astley is much of it new, and should be particularly valuable in New Zealand where the original collections are probably not available. These collections may also, as Dr. Lynam suggests in his concluding chapter, provide a quarry for future editors of the society's volume. This essay however is of more than merely bibliographic interest. It is also a stimulating commentary on two centuries' growth of geographic knowledge in England. As the authors note, towards the end of their period, the increase of documentary information was outgrowing the old methods of publication. Burney's work 'approaches more nearly a reasoned history of discovery than a conventional collection of voyages', but in any case its scope was limited to the Pacific. Pinkerton's collection 'came too late to be more than a mere miscellany of sources . . . The "universal" collection had had its day.' The time had come in fact for the piecemeal and yet collective effort, and the more rigorous scholarly standards, of the Hakluyt Society. The later chapters on the past, present and future of the society are of special interest to its members or those contemplating membership. Students however should note the fresh and well-written essay by Dr. J. A. Williamson on Richard Hakluyt, an excellent introduction to his work, and the slighter essay by Sir William Foster on Samuel Purchas, an extended revision of an earlier article. From this emerges at least one point of general interest, that Purchas's name should be pronounced Purkas. A list of the society's volumes and of the most important maps reproduced in them will also be of interest to geographers. One minor error in Dr. Lynam's chapter may be noted. It is anachronistic to suggest that Australian wool 'helped to keep the great English textile industry alive during the Napoleonic wars'.—W. P. Morrell.

The World in Maps

THE ROUND EARTH ON FLAT PAPER: Map Projections used by Cartographers. By Wellman Chamberlin, with drawings by Charles E. Riddiford. Washington: National Geographic Society, 1947, pp. 126.

Not long before the war, an Auckland men's clothing firm encouraged business by presenting cash customers with reprints of maps produced by the National Geographic Society of Washington. Not only is this an indication of how times have changed in the clothing trade; it is also a tribute to the well-deserved popularity of National Geographic maps. All who are acquainted with those excellent maps will welcome the appearance of this monograph, in the familiar format of *The National Geographic Magazine*, describing the principles of the projections used.

A 37-page introductory section by Dr. Gilbert Grosvenor, President of the Society, describes the society's map services with typical American genius for statistics. It is impressed upon readers that each edition exceeds 1,600,000 copies, enough maps to cover a 360-acre farm. The statistics seem to have gone astray in that the list of 39 current maps classified under projections does not quite agree with the descriptive list of 39 current maps at the end of the monograph; there are three maps in each list which do not appear in the other. It may be remarked, too, that the list of thirteen different projections used in the current maps is not a complete list of all the projections which the society has used in the past. The introduction includes testimonials from Army and Navy officers and airways officials, many of whom owed the success of a mission to the fact that someone was carrying a National Geographic map. If this reminds us of advertisements for patent medicine, there is the consoling reflection that in this case the product is worth the advertising. Probably the most valuable feature of this section is a series of a dozen photographs illustrating successive stages in the production of a map.

The major part of the monograph, and the one from which it takes its title, is a non-mathematical discussion of map projections by two of the society's staff cartographers, the text by Wellman Chamberlin, the illustrations chiefly from diagrams by Charles E. Riddiford. The majority of these diagrams are of such a high standard that the series in explanation of perspective projections, although quite good diagrams in themselves, appear crude in comparison. The text covers a brief history of cartography, the essential geometry of the sphere, and excellent descriptions of the principal projections. The emphasis is on those used by the National Geographic Society, which include two projections invented by the society's cartographers. In most cases, the factors which dictated the choice of a particular projection are explained.

The only item at which the reviewer would cavil is the use of the term *transverse* to describe what are really *oblique* projections. Attention is drawn to this point because the topographical maps of New Zealand are on Transverse Mercator, and it is not possible to reconcile these maps with the description of the 'Transverse' Mercator given here. The distinction is simple: the direct Mercator projection is based on a true-scale equator, the transverse Mercator on a true-scale meridian, and the oblique Mercator on a true-scale great circle which is neither the equator nor a meridian. Direct and transverse projections are both limiting cases of the general or oblique form, and possess distinctive features which warrant the use of special descriptive terms.

An appendix reproduces representative maps used to illustrate articles in *The National Geographic Magazine*. The price of the monograph is 60 cents, or 3s. 9d. in New Zealand currency; the reviewer has no hesitation in describing it as a bargain.

—L. P. Lee.

The Geologically Recent Past

GLACIAL GEOLOGY AND THE PLEISTOCENE EPOCH. By R. F. Flint. New York: John Wiley and Sons Ltd., 1947, pp. 589.

Its world-wide survey of the events of the Great Ice Age makes this book of very great value to anyone interested in the history of the recent past. Unfortunately, however, the author has delved into so wide a range of topics in somewhat limited space that the treatment of many of these topics has necessarily been inadequate. This criticism applies with particular force to Chapter 6, which deals with glacially-sculptured landscapes, and almost as much to Chapter 22 on theories in explanation of the pulsations of glaciation in the Pleistocene, and to the final one (Chapter 23) on the composition of the flora and fauna of that period and their implications regarding climates and land bridges.

The first two chapters of the book furnish an interesting historical account of the growth of the idea of the Pleistocene glaciation and a simplified statement of glacial ice and its motion, while the next chapter discusses the relation of thinning to terminal retreat with its reaction on the rate of flow of the glacier; it is shown how a zone of stagnant ice may be developed towards the terminal face during the wasting of a glacier.

In Chapter 4, after an abbreviated classification of ice bodies, the author goes on to discuss the nourishment of an ice sheet. He points out difficulties of the glacial anti-cyclone theory and shows that recent expeditions to Greenland, such as that of Wegener of 1930-1931, demonstrate that precipitation on the crest of the dome is small in comparison with that on its flanks; he suggests that the snowfall there is due to cyclonic storms which approach the ice sheet from the southwest and occasionally pass over it. The Greenland ice sheet contrasts with that of Antarctica in that it is not too cold to be receiving nourishment; in Antarctica the reverse appears to be the case. In this chapter also the author gives a useful brief account of modern glaciation in different parts of the world; this is supplemented by tables in Chapter 19 which list the extent of glaciated regions and thickness and volume of ice both for present-day and Pleistocene glaciers.

In Chapter 5 an account is given of grooves, striations, friction cracks and shatter marks in bed rock which are caused by over-riding ice and the opinion is expressed that, with ice sheets, erosion is considerable only near their margins where the rate of flow is much greater than in their more central portions. The author believes that plucking is likely to be effective only in the superficial zone of the rocks of the pavement, where the joints are relatively open; the depth of erosion with ice caps may be very small, for the Canadian shield only a few tens of feet.

Chapters 8 to 10 cover descriptions of the various deposits of glacial drift, using this latter term in the comprehensive American sense, and of related sand dunes and loess as well as of the interesting erosional effects of marginal and other meltwater streams. The next seven chapters (11 to 17) deal with Pleistocene glaciation and glacial stratigraphy with particular emphasis on North America. Then comes an account of the various methods that have been used in attempts to date some of the past events of the Ice Age: retreat of falls such as those of Niagara River; counts of varves; estimates of sedimentation; degree of weathering of various sediments, etc.

Chapter 19 is one of the most interesting in the book, for it deals with the changes of sea level that followed the fluctuations of glaciation and with the warpings, more particularly those of North America and Europe, that were a consequence of glacial loading and unloading. In the succeeding chapter there is statement of the alternation of glacial and interglacial phases that together comprise the Ice Age, and of the results manifested, for example, in ancient lakes such as Bonneville and Lahontan and in fluctuations of level in lakes of nonglaciated regions. In connection with alluviation, the author seems to have overlooked T. T. Paterson's paper on world correlation of the Pleistocene.

In Chapter 21, which deals with climates since the maximum of the fourth glaciation, an interesting point is brought out by evidence which shows that there was a maximum of warmth (with minor fluctuations) between 6000 and 4000 years from the present; since this 'climatic optimum', apart from minor fluctuations, it has become moister and cooler.

About 18 excellent reproductions of photographs and about 70 diagrams or maps illustrate the text of the book. Its extensive list of references is a tribute to the wide reading of the author.

In spite of imperfections that are unavoidable in any attempt to portray so wide a field of knowledge in relatively small compass, the book will prove of very great value to geologists and those others who desire knowledge of the events that in no small measure have shaped the physical features of the earth's surface today. Its author has collated a wealth of information which otherwise would have been inaccessible to most of his readers.—J. A. BARTRUM.

THE NEW ZEALAND GEOGRAPHICAL SOCIETY

OFFICERS
Chairman: Mr. W. B. Harris, M.A.
Secretary-Treasurer: Mr. B. J. Garnier, M.A.
Trustee: Mr. A. H. Payne, M.A.

Councillors:
Mr. A. C. Pitcaithly, M.A.
Mr. G. G. Harvey, M.A.
Hon. Editor: Dr. Kenneth B. Cumberland, M.A.
Hon. Assistants to the Editor:
Mr. J. L. Hewland, M.A.
Mr. J. W. Fox, B.A.

The New Zealand Geographical Society was founded officially in Wellington towards the end of 1944. Its real foundation, however, took place in Christchurch in 1939 when a group of enthusiasts formed what is now the Canterbury Branch of the Society. Their lead was followed in February 1944 in Wellington, and further branches came into being in Auckland and Dunedin early in 1945.

The aims of the Society as stated in the constitution are 'to promote and stimulate the study of geography'. These are the aims of more than one Society in the world and the New Zealand Geographical Society is particularly concerned with geography in New Zealand. It is therefore the Society's policy to stimulate geographic studies of New Zealand and matters closely related to the Dominion.

The Society undertakes the publication of a journal which at present appears twice a year. Branches of the Society organise lectures, study groups, and excursions, and encourage their members to prepare matter for publication in the Society's journal, the *New Zealand Geographer*. Contributions from overseas writers and those who are not members of the Society are also encouraged.

Membership of the Society is open to all persons interested in the aims of the Society. Full details of membership will be sent on request by the Secretary, New Zealand Geographical Society, Department of Geography, University of Otago, Dunedin, N.1.

MEMBERSHIP DUES

Individuals in New Zealand *fifteen shillings* per annum. (A special rate of *seven shillings and sixpence* is available to full-time student members of a recognised educational institution.)

New Zealand Geographer: SUBSCRIPTION RATES

Libraries, schools, etc. in New Zealand *ten shillings* per annum.
Individuals, libraries, schools, etc., overseas, *ten shillings* or *three dollars* per annum in local currency.

GEORGE **PHILIP** & SON, LTD.
LONDON ENGLAND

Supplies of our Atlases, Maps, Globes and Books are inevitably restricted at the present time. We are, however, doing our utmost to keep faith with our many customers in New Zealand, and we look forward to the time when conditions will permit us to meet all requirements in full and without delay.

INQUIRIES TO
GORDON KNIGHT
32 Endeans Buildings, AUCKLAND

CLIMATIC ACCIDENTS in Landscape-Making

By C. A. COTTON

This book, which has recently been reprinted, is the second in Professor Cotton's notable trilogy of works dealing with the forces and agents responsible for the shaping of landscape.

Its subject matter follows in natural sequence that of "Landscape as Developed by the Processes of Normal Erosion" and leads on to "Volcanoes as Landscape Forms".

Illustrated by line-drawings and photographs.

Second Printing

Indexed 354 pages

Price **32/6**

WHITCOMBE & TOMBS LTD.

NEW ZEALAND GEOGRAPHICAL SOCIETY

REPRINT SERIES

This series of reprints from the *New Zealand Geographer* was inaugurated early in 1946, and numbers will be added from time to time.

No. 2. LITERATURE AND LANDSCAPE IN NEW ZEALAND. *By Alan Mulgan* 2s. 0d.
(*Members: individual copies* 1s. 8d., *twelve or more copies* 1s. 2d. *each*).

No. 3. MANUFACTURING IN NEW ZEALAND: ITS OUTSTANDING CHARACTERISTICS. *By J. L. Hewland.* 1s. 3d.
(*Members: individual copies* 1s. 0d.; *twelve or more copies* 9d. *each*)

No. 4. LAND UTILISATION IN METROPOLITAN CHRISTCHURCH. *By F. Parks.* 2s. 6d.
(*Members: individual copies* 2s. 3d.; *twelve or more copies* 2s. *each.*)

No. 5. THE IMPORTANCE OF THE LAND: THE FUTURE OF NEW ZEALAND AGRICULTURE. *By Kenneth B. Cumberland* 1s. 3d.
(*Members: individual copies* 1s. 0d.; *twelve or more copies* 9d. *each.*)

OBTAINABLE from The Secretary, N.Z. Geographical Society, Department of Geography, University of Otago, Dunedin, N.1, or from WHITCOMBE & TOMBS LIMITED and other Booksellers.

PRINTED BY WHITCOMBE & TOMBS LIMITED—41804